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Marine Fisheries Abstracts

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Marine Fisheries Abstracts

UNITED STATES DEPARTMENT OF COMMERCE

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FOREWORD

The Department of Commerce's National Marine Fisheries Service publishes the monthly journal *Marine Fisheries Abstracts* as one means of communicating to the fishing industry and allied groups the status of current fishery research. The research includes the biological aspects of fishery science as well as technological studies dealing with aquatic resource supply, harvesting, processing, utilization, and distribution.

Marine Fisheries Abstracts contains summaries of selected articles from trade, engineering, and scientific journals dealing with the entire spectrum of fishery science. The publication is designed to serve the needs of fishery scientists, engineers, and managers in industry, academic institutions, and government by supplying timely information on current progress in fishery research and technology.

0.30 POTENTIAL HAZARDS OF $HClO_4$ IN HEATED SYSTEMS WHERE ESTERS ARE INVOLVED

Wharton, H. Whitney (Food Products Research, Winton Hill Technical Center, Procter and Gamble Co., Cincinnati, OH 45224)
Journal of the American Oil Chemists' Society 51, No. 2, 35-36 (Feb. 1974)

In this letter to the editor of this journal, the author cautions those who might use the $HClO_4$-catalyzed method for transesterification of triglycerides reported by P. J. Mavrikos and G. Eliopoulos (JAOCS 50, 174 [1973]). He believes the use of $HClO_4$ particularly in systems where esters are involved is potentially hazardous. Perchloratoesters of glycerine (or partial glycerides) may form, and they are highly unstable. They are also sensitive to heat and shock, and are particularly sensitive to trituration. The monoperchloratoester of ethylene glycol is thermally and shock sensitive, and it also explodes at the slightest provocation. Methyl perchlorate (produced from the methyl alcohol used in the transesterification method) might also be expected to be explosive. To those who want to use the procedure ($HClO_4$-catalyzed method), the author recommends that the reaction be carried out behind a sturdy safety shield, and that all materials be disposed of properly (such as by dilution with water and flushing down the drain with large amounts of water). FTP

0.36 (0.7) SELENIUM BIOCHEMISTRY

Stadtman, Thressa C. (National Institutes of Health, USDHEW, Bethesda, MD 20014)
Science 183, No. 4128, 915-922 (Mar. 8, 1974)

In 1817, Berzelius discovered the element selenium. In 1930, Se was identified as a potent toxic substance for livestock. In 1957, Se was identified as an essential dietary factor that protected rats from necrotic degeneration of the liver. This led to the recognition that several important livestock diseases are selenium deficiency syndromes. Animals and bacteria appear to require trace amounts of Se. When available in proper micromolar concentrations Se is incorporated into certain functional proteins of the cell. When more than the proper concentrations of Se are available to organisms their enzyme systems substitute Se indiscriminately for sulfur in cellular constituents. Se compounds are less stable and more reactive than the corresponding sulfur compounds; this may produce metabolic problems in the cell which may lead to the death of the organism.

An example of an enzymatic process which does not distinguish Se from sulfur (and therefore is related to Se toxicity) is adenosine triphosphatesulfurylase; this enzyme catalyzes the formation of 5'-adenosine phosphosulfate from adenosine triphosphate and sulfate. The enzyme is more active with an Se compound as a substrate than a sulfur-containing compound. In addition, several enzymes that react with methionine can also metabolize its Se analog selenomethionine, and in subsequent reactions, the Se analog eventually replaces methionine in the completed protein molecule.

0.4 (1.81) PARTICLE SORTING AND LABIAL PALP FUNCTION IN THE PACIFIC OYSTER CRASSOSTREA GIGAS (THUNBERG, 1795)

Bernard, F. R. (Fisheries Research Board of Canada, Nanaimo, British Columbia, Canada)
Biological Bulletin 146, No. 1, 1-10 (Feb. 1974)

Reports that bivalves exercise selectivity over ingested material are based upon comparing the stomach contents with material suspended in the environment and the direct observation of various particles on the exposed pallial (cavities in the mantle) surfaces. In addition, the functional interpretation of the complex ciliation of the pallial organs, in other previous reports, is predicated upon the movement of particular cilia and tracts and their effect on single particles. In contrast, the author suggests that the cilia of the ctenidium (a structure in the pallium) and palpi (fleshy, sensory projections) act primarily upon mucus and only indirectly on individual particles. Particle sorting activities in mollusks fall into two phases: the separation of inorganic particles from nutritious particles and possible selectivity between various organic entities, that is, between bacteria and algae.

Photographic and cytoscopic observations were made of various structures of the oyster including the inhalant and exhalant apertures, the pallial organs, and the labial palpi. The pumping volumes of water passing through the structures of the oyster and the speed and direction of mucus flow in excised palpi and whole specimens were monitored. In addition, oysters were exposed in shallow trays to various suspensions of bacteria (Chromatium warmingii or Chromobacterium amethystinum) alone or mixed with species of the algae Tetraselma and Chlorella.

0.5 EVALUATION OF TYPE A BOTULINAL TOXIN ASSAYS THAT USE ANTITOXIN TO CRYSTALLINE TOXIN

Sugiyama, H. (Food Research Institute and Dept. of Bacteriology, University of Wisconsin, Madison, WI 53706), I. Ohishi, and B. R. Dasgupta
Applied Microbiology 27, No. 2, 333-336 (Feb. 1974)

In this study, type A botulinal toxin assay by the reverse hemagglutination procedure which uses antitoxin to crystalline toxin was examined for specificity. In this procedure, a suspension of red-blood cells coupled with antitoxin is added to dilutions of toxin. The toxin level in the test sample is calculated from a comparison of the limiting dilutions of the sample and of the standard crystalline toxin solution of known concentration. However, there is some question that the procedure is specific for the neurotoxin. This paper presents evidence that the test for type A botulinal toxin is based on the reaction of a nontoxic protein instead of the neurotoxic protein. It is known that the crystalline toxin is a complex of neurotoxin (α component) and hemagglutinin (β component) which are held together by means other than covalent bonds. In the present study, neurotoxin ($A\alpha$) and a nontoxic protein ($A\beta$) were prepared in essentially pure forms by a two-step chromatographic procedure.

The antitoxin to crystalline toxin had a significantly higher titer to $A\beta$ than to $A\alpha$. In Formalin-treated red-blood cells sensitized with the antitoxin, the antibodies coupled to the cells were, from the practical aspect, only anti-$A\beta$. When the sensitized red-blood cell suspension is reacted with dilutions of type A

0.36 (0.7)

There are only three enzyme-catalyzed reactions in the current literature that are known to require the participation of Se-containing protein. These are reactions catalyzed by formate dehydrogenase of such bacteria as Escherichia coli and Clostridium thermoaceticum, glycine reductase of Clostridium species, and glutathione peroxidase of erythrocytes. Common to these three processes is the oxidation-reduction character of the reactions.

Selenium was identified as an essential nutrient for the prevention of such deficiency disease syndromes as white muscle disease of cattle, sheep, hogs, and poultry; exudative diathesis of chicks; liver necrosis of rats; and certain types of muscular dystrophy in a variety of animals. Identification of the chemistry of Se in proteins participating in electron transport processes should enable the determination of its specific action and elucidate the basic defects in certain cardiac and skeletal muscle degenerative diseases which are Se-deficiency syndromes. The availability and ease of isolation of the selenoprotein of the bacterial glycine reductase system makes it the material of choice for further studies on the mechanism of action of selenium.
[1 table, 84 references] SW

0.5

toxic solutions, the limiting dilutions are determined by Aß and not by the neurotoxin (Aα). Thus the nontoxic protein determines the end points of the reverse passive hemagglutination tests with type A toxic solutions. The neurotoxin (which should be the effective antigen in the assessment of toxicity) does not play a significant role. Even though the neurotoxin can be calculated or can be shown by mouse tests to be present in the titer dilution, this is not proof that it is the determinant in the titer. It follows, also, that the reported correlation between reverse passive hemagglutination titers and toxicities is not evidence that the test measures neurotoxin. Furthermore, it is not known if all type A cultures produce the same Aα to Aß ratio or if the ratio in crystalline toxin is the same as in the culture fluid from which the crystals are derived. If this ratio varies, then the quantification of neurotoxin in toxic culture fluids with the indirect approach could give significant errors.
[2 tables, 18 references] FTP

0.4 (0.6) RELATIVE TOXICITIES OF SELENITE AND SELENATE IN THE DRINKING WATER OF RATS

Palmer, I. S., and O. E. Olson (Dept. of Experiment Station Biochemistry, South Dakota State University, Brookings, SD 57006)
Journal of Nutrition 104, No. 3, 306-314 (Mar. 1974)

Conflicting data have appeared in published reports concerning the relative toxicities of selenite and selenate to rats. The relative toxicities of these two forms of selenium may become of increased importance should the addition of the inorganic form of selenium to animal diets be eventually approved. The present study was an attempt to determine whether or not there is an extreme difference between selenate and selenite toxicity to rats and to attempt to establish the level at which each becomes toxic when administered in the drinking water.

Several levels of sodium selenite or sodium selenate were administered in the drinking water of Sprague-Dawley rats (21 days of age) receiving a corn- or rye-based diet to determine the relative toxicities of the two forms of selenium. Levels of selenium of 2 or 3 ppm produced a small decrease in weight in 4 or 6 weeks as compared with the control, but no mortality occurred. There was no significant difference between the effects of the two forms of selenium with respect to weight gains. When rats were exposed to water containing 6 or 9 ppm of selenium as either ion, considerable mortality occurred. More rats receiving selenite died than did rats that received selenate. Overall, the toxicities of the two forms of selenium were similar.
[6 tables, 22 references] Partially abstracted; partially reprinted

0.4 (1.81)

Results of the observations and measurements of the oyster structures indicate that the pallium may be considered a chamber with a restricted inlet aperture and a larger exit aperture. The ctenidium separates the pallium into the entrance and outlet chambers and functions as the diaphragm in a diaphragm pump. This configuration results in a low water velocity in the inhalant chamber. Water containing suspended material enters the inhalant chamber; in this chamber separation and rejection of particles of high specific gravity occurs before impact upon the ctenidium due to gravitational settlement accompanying low water velocity. Particles that settle on the ctenidium are either rejected or carried in mucus to the labial palpi where the volume of mucus is reduced, and the concentrated food-mucus mass is passed to the mouth. The Pacific oyster was not able to separate purple bacteria from algae, but rapid digestion of the gut contents results in bacteria-free alimentary canal and feces.
[3 figures, 2 tables, 24 references] SW

0.4 SAFETY OF MARINE PRODUCTS. III. DISTRIBUTION OF (0.35)(6.54) DIMETHYLNITROSAMINE IN MARINE FOODS

Nakamura, Masayoshi, and Mutsuo Usuki (Hokkaido Cent. Fish. Exp. Stn., Yotchi, Japan)
Chemical Abstracts 80, No. 9, 46613r (Mar. 4, 1974)

0.5 COMPOUND INHIBITORY TO CLOSTRIDIUM BOTULINUM TYPE E PRODUCED BY A MORAXELLA SPECIES

Kwan, P. L., and J. S. Lee (Dept. of Food Science and Technology, Oregon State University, Corvallis, OR 97331)
Applied Microbiology 27, No. 2, 329-332 (Feb. 1974)

This paper contains a description of an antibioticlike substance, produced by a Moraxella species (strain A-43) (or Acinetobacter species, depending on the classification scheme used) that inhibited the outgrowth of C. botulinum type E. The Moraxella species were cultured in tryptone-peptone-extract medium (TPE), reinforced clostridia medium (RCM) minus agar and sodium thioglycolate, and Perigo medium (PM) minus sodium thioglycolate and bromocresol purple. All three media supported production of the inhibitory substance by Moraxella, but PM supported the maximal production. The outgrowth of germinated spores of C. botulinum was inhibited by a 1/10 dilution of the strain A-43 spent medium; germination was not affected. Estimated molecular weight of the inhibitor was 800 to 1,000. The inhibitor was dialyzable, and it could be concentrated by lyophilization. When the inhibitor was heated at 65° C for 10 min it was inactivated by 70%, but it was stable at 37°, 25°, and 5° C. It was not volatile and could not be vacuum distilled at 40° C. Acid solutions below pH 2.0 destroyed the activity of the inhibitor. The inhibitor appears to be about the same molecular weight of and shows similar inhibition characteristics to tylosin [an antibiotic produced by Streptomyces fradiale growing on certain soils].

To what extent antibioticlike substances, such as that produced by Moraxella species A-43, play in competition with C. botulinum in nature is not known. It

0.6 UPTAKE OF L-ARGININE AND L-LYSINE BY THE SMALL INTESTINE AND ITS INFLUENCE ON ARGININE-LYSINE ANTAGONISM IN CHICKS

Kadirvel, R., and F. H. Kratzer (Dept. of Avian Sciences, University of California, Davis, CA 95616)
Journal of Nutrition 104, No. 3, 339-343 (Mar. 1974)

The uptake of L-arginine and L-lysine by segments from various locations of the small intestine of 4- to 6-week-old male chickens was studied in an in vitro system using radioactive amino acids with the everted sac technique [T. H. Wilson and G. Wiseman, J. Physiol. 123, 116-125 (1954)]. The rates of uptake of both arginine and lysine increased significantly from the duodenum to the lower ileum, irrespective of whether the results were expressed on the basis of length or dry weight of the segment. The uptake of lysine was much faster than that of arginine. An excess of leucine inhibited the uptake of arginine much more than lysine, while an excess of glycine was without any effect. L-Lysine produced an arginine deficiency when fed to chicks whereas L-leucine did not. These results indicate that the lysine-arginine antagonism is not at the absorption level.
[7 tables, 18 references] Authors' abstract

0.5 STUDIES ON THE BACTERIAL FLORA OF FISH BODY--I. BACTERIA IN GILL, INTESTINE, BLOOD AND VISCERA OF APPARENTLY HEALTHY POND-CULTURED EELS

Chung, Huu-Yun, and Guang-Hsiung Kou (Dept. of Zoology, College of Science, National Taiwan University)
Journal of the Fisheries Society of Taiwan 2, No. 2, 20-25 (Dec. 1973)

One hundred and eight apparently healthy eels from ponds in Taoyuan, Roatung, Lukang, and Pingtung were collected and examined for the presence of aerobic bacteria in their gills, intestines, blood, and viscera. Three hundred and ninety cultures were isolated from these organs and were classified into the following groups: Aeromonas, Pseudomonas, Enterobacteriaceae, Vibrio, Flavobacterium, Achromobacter-Alcaligenes, and unidentified gram-negative rods. The first three groups were the most predominant. Of 106 strains examined, 26 were found to be virulent; most of these were Aeromonas (20 strains).
[4 tables, 17 references] FTP

0.6 (0.7) BIOMANIPULATION OF RUMINANT FATS

Johnson, A. R. (CSIRO Div., Food Research, Sydney, Australia)
Food Manufacture 49, No. 1, 19-20, 22, 24 (Jan. 1974)

The consumption of dairy products in many countries has declined while the consumption of alternatives containing vegetable oils has increased. One of the reasons for this pattern of consumption is the belief that cholesterol and saturated fat (which are at high levels in dairy products) contribute to coronary heart disease.

Despite the fact that the fatty acids of pasture grass eaten by ruminants are mostly polyunsaturated, the composition of the fat of various ruminants is high in saturated and monounsaturated fatty acids and very low in polyunsaturated fatty acids. The reason for the paradox is that the microorganisms resident in the forestomach of ruminants hydrogenate the fatty acids in their grass meal to the saturated and monounsaturated forms.

In 1967, a process was developed in which protein was reacted with formaldehyde. When this preparation was fed to ruminants, the resulting chemical bond resisted the microbiological attack in the rumen (forestomach) and was broken under the acid conditions of the true stomach (or abomasum); thus, the protein was protected until it was available for digestion in the abomasum. In a similar manner safflower oil was homogenized with casein, spray dried, and treated with formaldehyde. The resulting product was a powder consisting of oil droplets encapsulated

0.5 COMPARISON OF FLUORESCENT-ANTIBODY METHODS AND ENRICHMENT SEROLOGY FOR THE DETECTION OF SALMONELLA

Mohr, H. K., H. L. Trenk, and M. Yeterian (Technical Center, General Foods Corporation, White Plains, NY 10602)
Applied Microbiology 27, No. 2, 324-328 (Feb. 1974)

The objective of this study was to compare five different methods for the detection of Salmonella in foods and feeds. The methods were: (1) The conventional fluorescent antibody (FA) technique, a modification of direct FA staining as described by various researchers including D. L. Georgala and M. Boothroyd [J. Appl. Bacteriol. 28, 421-425 (1965)]; (2) a rapid direct FA technique, as described by N. F. Insalata, C. W. Mahnke, and W. G. Dunlap [Appl. Microbiol. 24, 645-649 (1972)]; (3) a microcolony FA technique, as described by B. M. Thomason [Appl. Microbiol. 22, 1064-1069 (1971)]; (4) the enrichment serology (ES) technique, as proposed by W. H. Sperber and R. H. Deibel [Appl. Microbiol. 17, 533-539 (1969)]; (5) the standard cultural methods with minor modifications (in Bacteriological Analytical Manual, Food and Drug Administration, USDHEW, Washington, D.C. [1972]). Three hundred and forty-seven subsamples from 16 different food and feed prototypes, alleged to be naturally contaminated with Salmonella, were analyzed.

Of the 347 samples, 52 were found to contain Salmonella by cultural methods. By the conventional FA technique all 52 culturally positive samples were identified; 51 were identified by ES technique; 48 by microcolony FA; and 34 by the rapid FA method. The number of false-positive samples for each technique was: ES-selenite, 7; ES-tetrathionate, 8; rapid FA, 26; microcolony FA, 33; conventional FA-selenite, 27; conventional FA-tetrathionate, 26. Tetrathionate enrichment was superior to selenite enrichment for recovery of Salmonella from most foods, but concurrent use of both media allowed maximum recovery.

[1 figure, 2 tables, 13 references] FTP

0.6 (0.7)

in a layer of formaldehyde treated protein. On feeding to ruminants, the preparation was able to pass through the rumen successfully; on reaching the abomasum, the formaldehyde-protein link was split and the unchanged oil was available for digestion and absorption into the animals' tissues. The formaldehyde is rapidly metabolized and does not accumulate in the meat or milk. In other experiments whole seeds, such as sunflower, were used as the source of the oil and the protein. This modification made the process economically viable and of commercial interest. This investigation was performed by T. W. Scott, P. J. Bready, A. J. Royal, and L. J. Cook [Search 3, 170 (1972)].

Milk, beef, and lamb can now be produced with high levels of polyunsaturated linoleic acid by using the protected lipids in the feed. The final concentration of linoleic acid in these food products depends upon the level of supplementation in the diet, the period of feeding, and the amount of fat originally present in the tissues. When 300 g/day of protected sunflower seed supplement, containing 35% oil, is fed to lambs for 4-6 weeks the linoleic acid content of the fat in the muscle increases from 5% to 20-25%. Similar increases occur in cattle and goats. This ability to biomanipulate ruminant fats to vary the nutritional elements in meat and milk will allow for diversification and expansion of the market for these products.

[1 table, 22 references] SW

0.5

is interesting, however, that Moraxella species (which are common in many seafoods) could not be recovered in smoked fish [J. S. Lee and D. K. Pfeifer, J. Milk Food Technol. 36, 143-145 (1973)].

[2 figures, 23 references] FTP

0.6 (4.6) LIPID OXIDATION AND FATTY ACID CHANGES IN BEEF COMBINED WITH VEGETABLES AND TEXTURED VEGETABLE PROTEIN

Sangor, Marcy R., and Dan E. Pratt (Dept. of Foods and Nutrition, Purdue University, West Lafayette, Ind.)
Journal of the American Dietetic Association 64, No. 3, 268-270 (Mar. 1974)

Earlier work by the second author showed that soybeans contain compounds that possess antioxidant activity which is carried over into products prepared from soy protein concentrates and isolates. In the present study, the researchers studied the protective effect soy textured vegetable protein might have on the lipids of a food system when used as a supplement to beef. If the concentrate demonstrated a protective effect, it would thus not only serve as a cheaper supplement to beef but would increase the storage quality of the product. The antioxidant effect was evaluated by determining the TBA number (milligrams of malonaldehyde per 1,000 g) of stored beef slices covered with textured vegetable protein extracts, vegetable extracts, textured vegetable protein plus vegetable extracts, and vegetable-beef soup.

The textured vegetable protein showed marked antioxidant effect on the lipids of the beef. The vegetables were less effective than were the textured vegetable proteins. The vegetable-beef soup also showed antioxidant effect.

[2 tables, 7 references] FTP

0.7 SELENIUM COMPOUNDS IN NATURE AND MEDICINE. A NUTRITIONAL (0.4) IMPORTANCE OF SELENIUM

Scott, Milton L. (Dep. Poult. Sci., Cornell Univ., Ithaca, N.Y.)
Chemical Abstracts 80, No. 9, 46672a (Mar. 4, 1974)

0.6 (1.0145) MATERIALY RYBOKHOZYAISTVENNYKH ISSLEDOVANII SEVERNOGO BASSEINA [FISHERY RESEARCH IN THE NORTHERN BASIN]

Anonymous
Polyarnyi Nauchno-Issledovatelskii i Proektnyi Institut Morskogo Rybnogo Khozyaistva i Okeanografii im. N. M. Knipovicha [The N.M. Knipovich Polar Scientific Research Institute (PINRO) and the Research and Design Institute of Marine Fisheries and Oceanography (NIKIMRP), Murmansk, U.S.S.R.] Report No. 20(1972), 184 pp. [In Russian]

This collection contains articles on the technology of fish processing methods. There are three articles on the effects of various biological and physical conditions on salt herring. Four articles contain discussions of carotenoids and lipid oxidation in frozen fish. Other articles cover freezing rate and quality of frozen fish, the microflora under freezing conditions, survival of spoilage microorganisms in canned fish, application of sterilized spices in preserved fish, and cooling rate relative to fish muscle. There are 11 articles that cover processing of fish. The subjects include cooling fish in a vacuum, theoretical work on a fish sorting machine with rollers, freezing with continuous thin layers of ice, production and power characteristics of smoking kilns, a hot smoking tunnel, a positive displacement fish feeder, testing rotary freezing plants, aluminum cans for fish, and polymer films for rish freezing and storing. Two other articles cover linear dimensions and mass of fish and quality control of fresh fish. The articles are illustrated and abstracted in Russian. SW

0.7 A CONSPECTUS OF RESEARCH ON ZINC REQUIREMENTS OF MAN

Halsted, James A. (Albany Medical College, Albany, NY 12208), J. Cecil Smith, Jr. Trace Element Research Laboratory, Veterans Administration Hospital, Washington, DC 20422), and M. Isabel Irwin (Nutrition Institute, Agricultural Research Service, U.S. Dept. of Agriculture, Beltsville, MD 20705)
Journal of Nutrition 104, No. 3, 345-378 (Mar. 1974)

In this conspectus the authors bring together information bearing on human requirements for zinc, show how the information was obtained, and point out areas where research is needed. The contents include: Introduction; Zinc in nature; Development of knowledge about zinc; Methods of measuring zinc; Zinc in food; Metabolic aspects of zinc in human nutrition; Zinc deficiency; Parameters for assessing zinc status in man; Zinc toxicity; Human requirements for zinc; and Conclusions.

The concept of the possible or probable deficiency of zinc in man is rather new, and the deficiency syndrome is not yet clearly defined. Some of the manifestations of inadequate zinc intake in animals and poultry (e.g. reduced bone growth, skeletal abnormalities, retarded sexual development) are probably more difficult to detect in human subjects because of their slower growth. There are few data on the quantitative needs for zinc in humans at any age level. Much more information is needed on indices of marginal zinc deficiency and on factors affecting availability and utilization of dietary zinc to make sound recommendations on the nutritional requirements and dietary allowances for different population groups. [1 figure, 6 tables, 330 references] FTP

0.7 SULFATE IN ANIMAL NUTRITION

Almquist, H. J. (Pacific Vegetable Oil International, Inc., San Francisco, Calif.)
Feedstuffs 18, No. 11, 22-23, 46 (Mar. 18, 1974)

This report is a revision and extension of a report the author made on the same subject in 1964. The nutritional significance of sulfate sulfur was demonstrated in practical animal feeding tests. Sulfate exists in various compounds, in addition to cystine and methionine, throughout the animal body. Among these compounds are chondroitin, a constituent of cartilage, bone, tendons, and walls of blood vessels; taurine, a major constituent of the water-soluble portions of feathers and also a constituent of a bile acid; and heparin, which functions as a blood anticoagulant. Sulfate is also used in the detoxification of many toxic substances present in the diet that depress growth in the chick. The growth-promoting effect of adding sulfate to the diets of rats has been reported earlier. A similar effect was observed in chicks, and the author suggests that the gains with sulfate in the diet indicate that the chicks cannot make sulfate fast enough from the sulfur amino acids (cystine and methionine) alone to achieve the maximal rate of gain. Furthermore, methionine could not meet the total sulfur requirement for growing chicks fed a diet low in cystine and inorganic sulfur. On the other hand, cystine was able to satisfy the sulfur requirement in a low methionine, low sulfur diet. However, the responses to inorganic sulfate depended upon the quantity of sulfur containing amino acids in the diet and also upon a methionine to cystine ratio of less than one in which cystine was more limiting than methionine.

0.7 (9.19) CADMIUM TOXICITY AND BIOCONCENTRATION IN LARGEMOUTH BASS AND BLUEGILL

Cearley, Jack E., and Ronald L. Coleman (Dept. of Environmental Health, University of Oklahoma Health Sciences Center, Oklahoma City, OK 73190)
Bulletin of Environmental Contamination and Toxicology 11, No. 2, 146-151 (Feb. 1974)

The heavy metal cadmium is highly toxic and it may be present in certain industrial discharges. The existence of cadmium in natural waters is of interest because of its direct toxicity to fish and because of the possibility that it may be concentrated by various organisms in the food chain. The purpose of this study was to determine and evaluate the effects of subacute exposure of largemouth bass and bluegill to cadmium. Assessment of the toxicological effects was based on behavior, rate of growth, and survival of the fish, and on the accumulation of cadmium in the tissues and organs of the fish. The 6-month bioassay was carried out using controlled artificial oxygenation of test solutions in laboratory aquaria. The levels of cadmium used were 0.85±0.19, 0.08±0.01, 0.008±0.001, and 0.0005± 0.0002 (control) mg/l. The young-of-the-year fish were acclimatized to laboratory conditions for 5 months before being used in the tests.

The largemouth bass seemed to be more sensitive to the cadmium than were the bluegill. The abnormal behavior patterns of both species of fish suggested that the nervous system was the site of the damage.

0.7

In the case of fish solubles in the diet, the activity of this ingredient in promoting growth may be due to its sulfate content as suggested in an earlier report. Distillers solubles seems to exhibit an effect that improves growth which is not explainable by its sulfate content. Methionine was readily incorporated into feathers, muscle, and liver in the chick, and inorganic sulfate was retained by the lining of the gizzard. Calcium sulfate was not as active as sodium sulfate in weight gain activity. Sodium thiosulfate, sodium bisulfite, and magnesium sulfate were as effective as sodium sulfate. Rats fed a sumplified casein diet required at least 1.1% sulfur amino acids in the diet with no inorganic sulfate and only 0.6% sulfur amino acids when the diet contained sulfate. Information from unpublished data indicates that 165 p/m of the sulfate ion was required for maximal growth of chicks on a diet deficient in sulfur amino acids when the methionine to cystine ratio was greater than 1. Further investigation is necessary to determine the precise sulfate intake required for maximal growth. Tests with ruminants indicated results similar to those reported for chicks and rats.
[2 figures, 3 tables, 45 references] SW

0.7 (9.19)

Cadmium accumulated in the fish at levels higher than those in the water. The amount of cadmium accumulated increased as the concentration level of exposure increased. After about 2 months of exposure of the fish to cadmium, an equilibrium developed between the level ot the metal in the water and the level in the tissues. In the bass, accumulation of cadmium was higher in the internal organs than in the gills and remainder of the body.
[4 figures, 7 references] FTP

0.7 SELENIUM IN FOOD-PLANTS AND FEEDS. TOXICOLOGY (2.9)(3.39) AND NUTRITION

Jaffe, Werner G. (Inst. Nac. Nutr., Caracas, Venezuela)
Chemical Abstracts 80, No. 9, 44415 (Mar. 4, 1974)

0.6 EFFECT OF ESSENTIAL FATTY ACID DEFICIENCY ON AMINO ACID UPTAKE BY THE SMALL INTESTINE OF RATS

Johns, John T. (Dept. of Animal Husbandry, Michigan State University , East Lansing, MI 48824), and Werner G. Bergen
Journal of Nutrition 104, No. 3, 300-305 (Mar. 1974)

Although it is known that essential fatty acids (EFA) are needed in the mammalian diet, we do not yet understand the nature of this essentiality. Because EFA's are an integral part of phospholipids in membranes, they may be involved in intestinal transmembrane absorption of digestion end products. On the basis of previous studies, it is possible that EFA's may play a role in amino-acid uptake in the intestine. In the present study, the researchers attempted to determine the effect of an EFA deficiency on methionine and lysine transport in rat jejunum and on hexose-amino acid transport interaction in rat jejunum.

Extracellular space (measured by inulin) became constant after a 40-minute in vitro incubation of intestinal rings from rats fed the control diet but continued to increase for rats fed the EFA-deficient diet. The K_m and V_{max} values of lysine and methionine transport were not affected by dietary treatments. However, the amino acid distribution ratios (capacity of cells to retain concentrated amino acids) were lower for intestinal rings from EFA-deficient rats. In intestinal rings from control and EFA-deficient rats, glucose was an inhibitor of methionine transport. It was concluded that the major effect of an EFA deficiency was to induce membrane alterations of intestinal mucosa that lowered the ability of mucosal cells to retain amino acids (enhanced noncarrier mediated efflux).
[2 figures, 4 tables, 22 references] Partially abstracted; partially reprinted

0.6 HYDROCARBON GROWN YEAST AS THE PROTEIN SOURCE OF DIET FOR DAIRY BEEF PRODUCTION

Mimura, Ko, Tsutaru Yoshimoto, and Katsunosuke Mitani (Dept. of Animal Husbandry, Faculty of Fisheries and Animal Husbandry, Hiroshima University, Japan)
Journal of the Faculty of Fisheries and Animal Husbandry Hiroshima University 12, No. 2, 101-116 (Dec. 1973)

Feeding tests were carried out with dairy-type calves to determine the value of hydrocarbon-grown yeast as a protein source. Groups of calves (starting at 3 months of age) were fed formula feeds containing hydrocarbon-grown yeast as a substitute for fish solubles, fish meal, or soybean meal (in the milk replacer, calf starter, or fattening diets). The calves averaged 483 days of age at the completion of the test. The results indicated that: (1) Growth of calves in the test and control groups was about the same. (2) It appears that the hydrocarbon-grown yeast could substitute for fish meal and soybean meal in the diet of calves. (3) Carcass characteristics and carcass grades of the calves fed hydrocarbon-grown yeast were higher than that for the control group. (4) The calves in all groups remained in good health during the entire period of the test.
[2 figures, 13 tables, 5 references] FTP

0.8 (9.19) DISTRIBUTION OF POLYCHLORINATED BIPHENYLS IN AN AERATED BIOLOGICAL OXIDATION WASTEWATER TREATMENT SYSTEM

Choi, P. S. K., H. Nack, and J. E. Flinn (BATELLE, Columbus Laboratory, Columbus, OH 43201)
Bulletin of Environmental Contamination and Toxicology 11, No. 1, 12-17 (Jan. 1974)

The fate of PCB in water and waste water treatment systems, especially in a secondary aerated oxidation system, is yet unknown. The purpose of this study was to determine the PCB distribution in a secondary aeration system and to examine the effect of PCB on the system's performance. The laboratory secondary sewage treatment system consisted of an aeration tank and a clarifier. The feed rate was set to provide 5-10 h mean residence time. The airflow rate was set to keep the dissolved oxygen level in the aeration tank at about 4 p/m or higher. The waste water used to feed the system was a natural waste water collected from the effluent of primary treatment in a municipal sewage treatment plant. The PCB (Aroclor 1254) was added by first mixing it with n-butanol and then emulsifying this mixture in the waste water by treating with ultrasound at 0.2-0.3 ampere for 4 to 6 min. A typical test run was as follows: The secondary biological oxidation system was operated 5-10 days to reach a steady state condition; PCB was introduced for 2-3 days; and then the final operation was carried out for 4-8 days.

The secondary aerated biological oxidation system removed a high percentage of the PCB from the waste water. However, the authors believe that the treatment system does not biodegrade or convert PCB to lower molecular weight or other types of chemical substances which are readily degradable. The PCB is probably either

1.0118 (2.12) LAKE ERIE BOTTOM TRAWL EXPLORATIONS, 1962-66

Bowman, Edgar W. (Northeast Fisheries Center, National Marine Fisheries Service, Woods Hole, MA 02543)
NOAA Technical Report NMFS SSRF-674, National Marine Fisheries Service, NOAA, U.S. Dept. of Commerce, Seattle, WA 98105)(Jan. 1974), 21 pp. (Single copy may be obtained from NOAA Publications Section, Rockville, MD 20852.)

The Bureau of Commercial Fisheries (now the National Marine Fisheries Service) Exploratory Fishing and Gear Research Base, at Ann Arbor, Mich., surveyed the abundance, availability to the otter (bottom) trawl, and depth distribution of various Lake Erie fish stocks between April 1962 and October 1966. The four exploratory cruises, conducted aboard the research vessel Kaho, clearly demonstrated the effectiveness of the bottom trawl in producing commercial quantities of yellow perch Perca flavescens and rainbow smelt Osmerus mordax. Freshwater drum Aplodinotus grunniens, carp Cyprinus carpio, channel catfish Ictaiurus punctatus, and white bass Roccus chrysops, were all produced in commercial quantities at least once during the study and collectively accounted for 17.1% of the total landings.

Between the first exploratory cruise in 1962 and the last in 1966 the abundance of yellow perch decreased significantly, and that of alewife, Alosa pseudoharengus, increased dramatically.
[9 figures, 1 table, 9 references, appendix with 7 tables] Author's abstract

0.9 (9.2)(9.7) BARRIERS TO INTERNATIONAL TECHNOLOGY TRANSFER

Steele, Lowell W. (Corporate Research & Development, General Electric Co., Schenectady, N.Y.)
Research Management 17, No. 1, 17-21 (Jan. 1974)

The author discusses four technology transfer problems faced by multinational firms, and he offers some suggestions for negotiating R&D transfer with the U.S.S.R. The author's company achieves technology transfer through export sales, through technical licensing agreements, and through work with affiliated companies. The problems of technology transfer relate to the user's circumstances as much as it does with the supplier's situation. Considered from the user's situation, there are four classes of technology transfer problems. First, there is the investment barrier in the foreign country as the major problem in introducing a new technology --that is, the capital needed to create the capability is the critical problem. Secondly, there is the local application barrier for use of the product in the local market. Thirdly, an adaption barrier may exist where the manufacturing process must be rescaled or modified to local market needs or to meet the local scale of production. Finally, there is the technical capability barrier.

The author emphasizes that we must begin to change our point of view on technology transfer. In the past, we have tended to regard technology as sunk cost--the money was already spent and any further returns by way of export sales or licensing is incremental income. In this way we tend to undervalue technology. We must, therefore, learn to price value technology and to avoid handing to foreign

1.7 (0.6)(0.7) SHARK FLESH IN THE FOOD INDUSTRY

Gordievskaya, V. S.
Pacific Scientific Research Institute of Marine Fisheries and Oceanography (TINRO) Vladivostok, U.S.S.R. (1971), iv + 26 pp. Available from the U.S. Dept. of Commerce, National Technical Information Service, Springfield, VA 22151. Order No. TT 72-50020.

Catching sharks for food is a longstanding practice all over the world. Hundreds of thousands of kilograms are caught annually off Norway, Britain, the United States, and Japan. The shark meat is marketed chilled, frozen, or processed. From 1963, studies in the U.S.S.R. have been in progress to determine the food value, the technological characteristics, and other uses of shark meat.

The results of analyses of 20 shark species have been tabulated in various categories. The ratio of body parts in percent of the total body are listed. The parts include trunk, fillet, head, viscera, liver, bones, fins, and skin. To use the tiger shark as an example, the trunk consisted of 44.6% of the total body, the head 21.3%, the liver 17.5%, skin 8%, the fins 4.9%, and fillets 36.2%. A table lists the composition of the sharks under moisture, protein, fat, and mineral substances. Other tables list nonprotein nitrogenous substances such as trimethylamine and urea, and nitrogenous substances including protein. Liver fats by saponifiable characteristics and saturatability are also listed.

In the section on food technology, there are discussions and tables on the organoleptic evaluation of shark meat, the urea content as a flavor factor, changes

0.9 (9.2)(9.7)

countries a competitive advantage by selling them technology for much less than it would cost them to develop it themselves. In many cases, we are dealing with discrete transactions involving a one-shot sale. Thus, there is no continuing stream of income from royalties or from future sale of products, and the pricing of that one-shot sale determines whether or not the transaction was profitable. This is a challenging situation that calls for a different way of thinking. FTP

0.8 (9.19)

dissolved in the fat in the sludge, adsorbed at the surface of the suspended material in the sludge, ingested by the microbial cells in the sludge, or a combination of all three.

The authors suggest that these experiments be expanded because the results have a bearing on present sludge handling methods. Furthermore, landfill, land spread, and ocean dumping of sludge should be reexamined to keep PCB under control if the amount of PCB discharge to streams increases. Also, the incineration of sludge should be examined to determine the fate of PCB in that system.
[2 figures, 24 references] FTP

1.7 (0.6)(0.7)

in urea content after soaking in water, elimination of urea in the pickling process, and urea content after heat processing. Yield of smoked and cured products, and sausage from shark meat are also covered. A section includes processing techniques and methods of cooking fins from various species of shark. The bibliography consists mostly of publications in Russian. There is a list of sharks by Russian, English, and scientific nomenclature.
[5 figures, 16 tables, 16 references] SW

1.24 (9.6) THE PILCHARD

Cuiley, Michael
Published by Pergamon Press, 18a Boundary St., Rushcutters Bay, N.S.W. 2011, Australia (n.d.), 241 pp. $22.50.
Australian Fisheries 33, No. 1, 44 (Jan. 1974)

In this book, the author discusses the biology, history, economics, and technology of the English pilchard fishery. It also contains reviews of the South African and California (U.S.A.) sardine fisheries. FTP

0.9 (9.2)(9.7) NATIONAL RESEARCH POLICY AND SUPPORT IN WESTERN EUROPE

Toxopeus, E. J. G. (Shell International Research Co., The Hague, Netherlands)
Research Management 17, No. 1, 22-26 (Jan. 1974)

In all developed countries, scientific policy is part of the national policy; this is to insure that science is applied as an aid to national security and to economic advancement and social welfare. In Western Europe most of the research to meet industrial needs is carried out by industry itself with any government spending serving merely as a supplement. But in university research and in government research for public needs the government is the main source of funds. In Europe research is not farmed out by governments to industry to the extent comparable with that in the United States. Governments help industry by placing orders for advanced-type equipment--a spin-off benefit from the R&D. But, even so, the European countries are divided in this respect. In Germany, R&D is carried out by industry in the nuclear field supported by Government funds; in Britain the Netherlands the case is not the same.

FTP

1.3 (9.10)(9.6)

THE SALMON THEIR FIGHT FOR SURVIVAL

Netboy, Anthony
Published by Houghton Mifflin Co., Boston, Mass. (1973), xxi + 613 pp.

This book is a history of the salmon from evolutionary beginnings to current problems the several species face in Europe, North America, and Asia. Part 1 is devoted to the biology of the salmon. Part 2 covers the Atlantic salmon with descriptions of the fishery conditions in Great Britain, Ireland, France, Spain, Germany, the Baltic States, Canada, the United States, and Greenland. Part 3 contains discussions of the Pacific salmon relative to dams on the Columbia River, the Puget Sound, British Columbia, and Alaska fisheries, Oregon's coastal streams, the Willamette River, and salmon culture. Part 4 covers the Asian salmon source in Japan, Russia, and Korea. Part 5 contains descriptions of salmon for sport and food.

The book contains 28 photographs, 5 drawings, and 33 maps. There are 31 tables and charts that include information on catches of salmon in California, Oregon, Washington, British Columbia, Alaska, Japan, Russia, and Norway. Other charts contain information on the salmon pack and number of canneries on the Columbia River and in the Puget Sound, Alaska, and British Columbia regions. The nutritional value of salmon, major salmon rivers for sport fishing, and ocean sport fishing regulations for Pacific coastal states are also listed.

Each chapter of this book contains a series of notes and a bibliography; a 19-page index is included. SW

1.93 (9.6) SEA TURTLES AND THE TURTLE INDUSTRY OF THE WEST INDIES, FLORIDA, AND THE GULF OF MEXICO

Rebel, Thomas P.
Published by the University of Miami Press, Coral Gables, Fla., rev. ed. (1974), 250 pp., illus. $10.00.

Since the publication of the first edition of this book in 1949, the amount of information on marine turtles has doubled; the additional information is summarized in the second edition. In a series of short chapters, the subjects covered include taxonomy; illustrated descriptions of the species; distribution, growth and age; habitats; and food and predators of sea turtles. The chapter on the breeding habits of the turtles gives details for each species. Other chapters give descriptions of migratory routes, and physiology and behavior. The chapters on the relationships of man to the turtles include fishing methods, products from turtles, cultivation of turtles, and the value of the turtle fishery and its administration. The last chapter is a discussion of the state of depletion of turtles with recommendations for conservation.

The highlight of this book is a 94-page annotated, indexed bibliography. The earliest item in the bibliography is by Mark Catesby, an Englishman who, in a series of observations between 1731-43, described the habits of the turtles and the commerce in turtle products in Carolina, Florida, and the Bahamas. The works of persons well known in nature study are also entered in the bibliography. Their names and dates of first publication include: L. Agassiz, 1857; E. D. Cope, 1971; J. J. Audubon, 1834; H. L. Babcock, 1919; Thomas Barbour, 1908; William Beebe,

2.1121 (2.1125) (2.1126) FAO FISHING MANUAL. NETTING MATERIALS FOR FISHING GEAR

Klust, Gerhard
Published by Fishing News (Books) Ltd., 23 Rosemount Ave., West Byfleet, Surrey, England, by arrangement with Food and Agriculture Organization of the United Nations (1973), xi + 173 pp. £2.60.

The first section of this book deals with the raw materials used in netting. These include the vegetable fibers and the synthetic fibers. Rotting and preservation against rotting are the main points discussed on the vegetable fibers. The discussion on synthetic fibers covers manufacturing processes, chemical classes, trade names, and fiber types. The physical characteristics with reference to filaments, endurance, density, and test methods for determining the characteristics are described. The second section covers construction of netting, twisted netting, Japanese twisted netting, and braided netting yarns. Terms, definitions, and properties of yarns are given with illustrations. Abrasion, breaking loads, test methods, and characteristics of yarns in water is also covered. The third section covers the choices of netting materials for various fishing gear including bottom trawl nets, midwater trawl nets, purse seine nets, gill nets for salmon, cod, and mackerel, and drift gill nets for herring and sardine. There is a bibliography with 138 references, and the book has 63 illustrations. SW

2.05 (0.5) EFFECT OF STORAGE AT 5 C ON SURVIVAL OF VIBRIO PARAHAEMOLYTICUS IN PROCESSED MARYLAND OYSTERS (CRASSOSTREA VIRGINICA)

Goatcher, Lydia J., Sharon E. Engler, David C. Wagner, and Dennis C. Westhoff (University of Maryland, College Park, MD 20742)
Journal of Milk and Food Technology 37, No. 2, 74-77 (Feb. 1974)

V. parahaemolyticus has been reported to be present in the shellfish and waters of Chespeake Bay; and the microorganism has been implicated as the cause of about 50% of the foodborne illnesses in Japan where the outbreaks are due to consumption of raw fish. Since oysters are often consumed raw, they are a potential source of food poisoning caused by V. parahaemolyticus. The purpose of this present study was to test the survival of the microorganism at various inoculum levels in oysters during the recommended storage time at 5° C . Also the media and methods for enumeration of V. parahaemolyticus in oysters were compared.

Fresh Maryland oysters (C. virginica) were inoculated with various strains of V. parahaemolyticus at various levels. The inoculated oysters were stored for periods up to 13 days at 5° C. The number of viable cells in the oysters were determined at regular intervals by two methods: the direct plating method and a most probable number (MPN) method. The results indicate that the number of cells detected depended upon the strain, inoculum level, and method of enumeration. The direct plating method was unreliable; and results varied in relation to the plating media used. After inoculating oysters with strains 3525 and 8700 at a level of 10^6 cells/g, viable cells were not detected in the direct plating method after 3 and 5 days of storage. Using the MPN method, low numbers of viable cells were

2.1121 (0.8) STUDIES ON MATCHING THE GEAR SIZE TO THE ENGINE POWER OF THE TRAWLER

Huang, James C. C. (National Cheng-Kung University, Dept. of Naval Architecture and Marine Engineering), L. Y. Cheng (Taiwan Fisheries Research Institute, Dept. of Marine Fisheries), T. H. Chi, C. M. Lee, and T. J. Lee
Journal of the Fisheries Society of Taiwan 2, No. 2, 1-10 (Dec. 1973)

Field tests were carried out on the towing power of a No. 82 Kwang-Yang stern trawler and on the comparative working behavior of the regular two-panel trawl net equipped with V-doors and a six-panel trawl net equipped with upright otter boards. One table gives, for each net, data on the wind direction, pitch angle, depth, engine speed, estimated shaft horsepower, towing speed, warp length, dip of warp, cross angle of warp, tension in warp, height of net mouth, and calculated distance of otter boards.
[10 figures, 2 tables, 17 references] FTP

2.05 (0.5)

detected after 7 and 13 days of storage. At inoculum levels of 10^4 and 10^2 cells/g, the direct plating method count was inaccurate, and no cells were detected by the MPN method after 5 days of storage. Loss of viability of both strains occurred most rapidly within the first 24 h of storage. Strain 8700 survived in greater numbers than did strain 3525 throughout the conditions of the study. SW
[2 figures, 3 tables, 17 references]

FTP

[4 figures, 15 references]

1.93 (9.6)

1924; R. L. Ditmars, 1910; Linne (known also as Linnaeus), 1758; John Steinbeck, 1941; Charles H. Townsend, 1890; A. Villiers, 1955; and Albert I, Prince of Monaco, 1898. The works of Archie F. Carr (beginning with a 1942 report) alone and with collaborators, take up over six pages of the bibliography. Contributors from government agencies and their authors are also listed in the bibliography. The agencies include U.S. Fish and Wildlife Service; Bureau of Commercial Fisheries (predecessor of the National Marine Fisheries Service); Florida Dept. of Natural Resources; Porto Rico Fish and Wildlife Conservation Division; and National Marine Fisheries Service. A subject index is provided in the book. SW

2.1127 (2.1123) THE SILVER CARP BAIT EXPERIMENT FOR TUNA LONGLINING

Huang, Che-Chung, Nin Sun, and Rong-Tsong Yang (Tuna Research Center, Institute of Oceanography, National Taiwan University)
Journal of the Fisheries Society of Taiwan 2, No. 2, 26-34 (Dec. 1973) [In Chinese; figures, tables, and abstract in English]

Silver carp was compared to milkfish, tilapia, and saury as bait for longlining of tuna. Eight fishing trials were carried out in an area east of the Philippine Islands. The results indicated that (1) saury appears to be a better bait than silver carp; (2) milkfish and tilapia had a better hook survival rate than did silver carp; (3) there was no difference in the size of the fish caught by the various baits; and (4) the hooking rates for silver carp, milkfish, and saury were about the same. The authors believe that silver carp might be a useful substitute bait for saury or milkfish.
[6 figures, 4 tables, 13 references, appendix with 1 figure and 2 tables] FTP

2.113 (2.117) STAINLESS CAST STEEL OF HIGH CORROSION RESISTANCE AND FATIGUE STRENGTH IN SEA WATER

Tokuda, Akira, and Arihiro Taida (Japan Steel Works, Ltd.) (pat.)
Japan. 73 14,527 (May 8, 1973)
Chemical Abstracts 80, No. 8, 39938p (Feb. 25, 1974)

2.00 (8.8)(3.12) RAPID DETECTION OF "GREEN TUNA MEAT" AND THE METHOD OF PREVENTING ITS FORMATION

Chung, Chung-Young, Hsueh-Liang Chen, Chyuan-Yao Wu, and Shao-Kuo Huang (Fish. Technol. Dept., Taiwan Provincial Kaoshiung Junior College of Marine Technology)
Journal of the Fisheries Society of Taiwan 2, No. 2, 11-15 (Dec. 1973) [In Chinese; figures and abstract in English]

A correlation was established between the trimethylamine oxide (TMAO) content of tuna and the frequency of "green meat" (discoloration) of the tissue. The coefficient of correlation between TMAO content and frequency of greenness was 0.952 (n = 720). The research also found that use of sodium bisulfite in cuna sauces or pastes would prevent greening.

2.111 PRESERVATION OF COTTON FISH NET TWINES BY TANNING. II. FIXATION OF TANNIN

Cecily, P. J., M. K. Kunjappan (Craft Gear Div., Cent. Inst. Fish. Technol., Cochin, India)
Chemical Abstracts 80, No. 8, 38184c (Feb. 25, 1974)

2.113 SEA WATER RESISTANT ALLOY

Udea, Shoji, Shintaro Matsuo, and Kazuhiko Mato (Mitsubishi Heavy Industries, Ltd.) (pat.)
Japan. 73 14,526 (May 8, 1973)
Chemical Abstracts 80, No. 8, 39939q (Feb. 25, 1974)

2.112 (9.6) MODERN INSHORE FISHING GEAR. RIGGING AND MENDING

Garner, John
Fishing News (Books) Ltd., 23 Rosemount Ave., West Byfleet, Surrey, England (1973), 69 pp. Price £3.75.

The purpose of this book was to provide inshore fishermen guidance in the use of the most suitable nets for specific fishing activities and to cover the essentials of net repair and maintenance. The various sections consist of: Development of inshore fishing nets; The use of fishing nets in inshore waters; Specifications for inshore fishing nets; Fitting and rigging inshore fishing nets; A practice net for the beginner; Net braiding; Net mending and assembly, Parts 1 and 2; and the appendix (contains a description of the current method of specifying nets and rigs). The book contains 68 illustrations. FTP

2.3 CRAB PROCESSING. 1. SANITATION

McCullough, William E. (Dept. of Food Science, University of Florida, Gainesville, Fla.)
Florida Sea Grant Publication SUSF-SG-73-003, Marine Technological Series, Published by the State University System of Florida, University of Florida, Gainesville, Fla. (n.d.), 3 pp.

This document was prepared and printed to provide current technical information on the sanitary practices in crab processing to persons interested in the commercial fishing industry. The discussion deals with the sanitary aspects of (1) the selection and use of equipment and utensils, (2) the processing procedures, (3) the facilities, and (4) personnel and general practices. FTP

2.43 MICROPOROUS POLYMERIC FILMS
(3.2382)

Bierenbaum, Harvey S., and Robert B. Isaacson (Celanese Plastics Company, Summit Technical Center, Summit, NJ 07901), Melvin L. Druin, and Steven G. Plovan
Industrial & Engineering Chemistry Product Research and Development 13, No. 1, 2-9 (Mar. 1974)

Recent research has dealt with the changes in the morphology of crystalline polymers resulting from macroscopic stress. This paper describes a result of these studies, the development of a new group of engineering plastic films with unique microporous structures with commercial applicability. These films are characterized by a large number of submicroscopic pores (2000 by 200 Å) of striking uniformity. These films have the desirable properties of thermoplastics (resistance to chemicals, high mechanical strength) and also exhibit rapid gas, vapor, and liquid transport rates. Potential end uses of such films involve the following categories: functional medical (burn dressings); membrane and ultrafiltration (battery separators, bacteria filters, dialysis, water purification); industrial processing (degassing); insulation and protective barriers (acoustical film, mattresses, blankets); sterile packaging; disposables (diaper covers, disposable protective clothing); apparel (linings, raincoats); household furnishings (travel bags, upholstery); tape, wrap, and packaging (food wrap, industrial tape, controlled environment packaging).
[13 figures, 4 tables, 37 references] FTP

3.15 STATUS OF THE RADAPPERTIZATION OF MEATS

Rowley, D. B., Abe Anellis, E. Wierbicki, and A. W. Baker (U.S. Army Natick Laboratories, Natick, MA 01760)
Journal of Milk and Food Technology 37, No. 2, 86-93 (Feb. 1974)

Since 1954 the U.S. Army and the Atomic Energy Commission (AEC) have been involved in most of the research and development on food irradiation in the United States. The program of the AEC is based on attempts to increase the refrigerated shelf life of fruits, vegetables, fin fish, shellfish, and poultry through use of irradiation. The Army's chief objective is to increase the shelf life of packaged meats by irradiation. In this program, progress has been made toward the development of acceptable radappertized meats. Before irradiation, raw meat is heated to an internal temperature of 65° to 80° C to inactivate proteolytic enzymes. The enzyme inactivated meat is vacuum packed in metal cans or flexible pouches, frozen, and irradiated at -30° C (±10° C) using gamma rays or electrons with a linear accelerator. Irradiation at the low temperature results in a marked improvement in quality over ambient temperature irradiation for most products. The improvements include reduction in off-color, off-odor, and irradiation flavor. Juiciness of irradiated pork, beef, and chicken has been improved by adding to these meats, before enzyme inactivation, 0.5% to 1.0% NaCl and 0.3% to 0.5% sodium tripolyphosphate. These salts also reduce loss of natural juices during cooking.

To assure that radappertized meats are free of pathogenic and spoilage microorganisms, they are subjected to a minimum radiation dose (MRD). The most resistant strain of Clostridium botulinum spores are used as the microbial index for

3.238 PHTHALATES IN FOOD
(2.9)(0.6)

Prepared by the Institute of Food Technologists' Expert Panel on Food Safety and Nutrition and the Committee on Public Information (Institute of Food Technologists, 221 N. LaSalle St., Chicago, IL 60601)
Food Technology 28, No. 3, 75-76 (Mar. 1974)

Phthalates are used as "plasticizers" in the manufacture of vinyl plastics. Vinyl plastics in their unmodified form are brittle and glasslike, but when formulated with a plasticizer (e.g. phthalates) almost any degree of suppleness and flexibility can be achieved. Phthalate-plasticized vinyl plastics are used in food wrappers and containers. Actually, the total food-related use of phthalates amounts only to about 2% of the total industrial use of phthalates (or about 18 million pounds). The phthalates are fairly nonevaporating and are not easily extracted from the plastic substance with which they are in contact.

Man may be exposed to phthalate plasticizers by contact with the skin (as in clothing or upholstery applications), by inhalation into the lungs (from vaporized plasticizer); and by mouth (the plasticizer has migrated into a food from its package or is present in a food, such as fish that has accumulated phthalates from the environment).

Phthalates have been tested in short-term and long-term studies using various animals, including the rat and the dog. These studies indicated that repeated exposure of animals to phthalate esters does not produce significant toxic effects

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2.3 POSSIBILITIES OF REMOVAL OF ORGANIC COMPOUNDS FROM WASTE GASES

Quillmann, Heinrich (DECATOX, G.m.b.H., Frankfurt, M., Germany)
Chemical Abstracts 80, No. 10, 51917p (Mar. 11, 1974)

3.15

determining the MRD required to assure the microbiological safety and stability of irradiated foods. The MRD is defined as the dose that results in a reduction of the most radiation resistant strain of C. botulinum spores by 12 log cycles. Inoculated pack studies are carried out to obtain the data required for computing the MRD. Cured meats have a lower MRD than uncured meats. Of the bacterial vegetative cells examined, Micrococcus radiodurans and Streptococcus faecium were reported to be the most resistant to low-temperature gamma irradiation. Before the radappertization process can be established commercially, proof that products so treated are safe for consumption must be established. An intensive animal feeding study of radappertized (4.7-7.1 Mrads) beef was init ated in 1971 and is expected to be complete in 1976. Additional studies recommended by the Food and Drug Administration involve mutagenesis, teratogenesis, presence of pesticide residues and heavy metals, and toxicology of volatile radiolysis products in the beef.
[4 figures, 5 tables, 43 references] SW

3.238 (2.9)(0.6)

except at high doses. Also, there is no evidence of toxicity in man due to phthalates from foods, beverages, or household products as ordinarily consumed or used. In further consideration of the limited use of phthalate-containing food packaging materials and the low rate of migration of plasticizer from the package to the food, the Committee believes the present use of phthalates in food packaging represents no hazard to human health.
[8 references] FTP

3.2385 PYROLYTIC EVAPORATION OF A PLASTICIZER FROM POLYVINYL CHLORIDE MEAT WRAPPING FILM (9.19)

Jaeger, Rudolph J. (Dept. of Physiology, Kresge Center for Environmental Health, Harvard School of Public Health, Boston, MA 02115), and Ronald A. Hites
Bulletin of Environmental Contamination and Toxicology 11, No. 1, 45-48 (Jan. 1974)

The researchers demonstrated that the plasticizer di-2-ethylhexyl phthalate was released from PVC (polyvinyl chloride) film during heating for a 1.5 h period at 275°-350° C.
[1 figure, 1 table, 5 references] FTP

2.3 SHRIMP SPLITTING AND CLEANING APPARATUS

Domecki, Edward H. (2140 N.E. 30th St., Lighthouse Point, FL 33064) (pat.)
U.S. Patent 3,787,928 (Jan. 29. 1974)

In this machine, the shrimp are mounted on a rotating transport wheel which feeds them through a splitting and cleaning mechanism. The apparatus is especially designed for processing rock shrimp which have a heavy, hard shell. FTP

2.3 QUALITY TOLERANCES FOR WATER FOR USE IN FISH PROCESSING

Thomas, Francis, and Cyriac Mathen (Cent. Inst. Fish Technol., Cochin, India)
Chemical Abstracts 80, No. 8, 40845h (Feb. 25, 1974)

3.3 THERMOBACTERIOLOGY IN FOOD PROCESSING
(0.5)(9.6)

Stumbo, C. R. (University of Massachusetts, Amherst, Mass.)
Academic Press, Inc., New York, N.Y., 2d ed. (1973), xix + 329 pp.

After the achievement of Appert in 1810, Pasteur, Prescott, and Underwood introduced scientific principles into the preservation of foods by heat processing. This text for students is intended to disseminate the knowledge, gained since then, relating to the canning of foods. There are chapters on the important organisms in spoilage; bacteriological examination of spoilage in canning; and the organisms to be eliminated in pasteurization. There are chapters on thermal resistance of microorganisms, determination of thermal resistance in bacteria, and obtaining spores for testing thermal resistance. One chapter is devoted to contamination and control of contamination. The next eight chapters are concerned with evaluation of the thermal process. The subjects covered include survival and lethality; heat penetration; method of choice in process evaluation; mathematical methods in process evaluation; conversion of heat penetration data; equivalency of pasteurization processes; and quality factor degradation. There is a chapter on process determination problems for canned foods. There are tables on quality retention of various nutriments under varying conditions of heating and cooling; derivatives of the lethality equation (Fs) and quality degradation factor; and the derivation of the equation for temperature conversion for different retort and initial temperatures. The book has a subject index. Each chapter contains a bibliography. SW

3.338 FACTORS CONTROLLING THE CORROSION OF TINPLATE. FIFTY-YEAR SEARCH FOR THE ABOMINABLE SNOWMAN

Lueck, Roger H. (20016 Winter Lane, Saratoga, CA 95070)
Industrial & Engineering Chemistry Product Research and Development 13, No. 1, 18-29 (Mar. 1974)

This paper is a detailed review of the factors controlling the corrosion of tinplate and of the 50 years of research in resolving the problem as related to the canned food industry
[10 figures, 5 tables, 59 references] FTP

3.338 PROMOTION BY NITRATES OF THE DISSOLUTION OF TIN BY ACIDS AND ITS INHIBITION

Sherlock, J. C., and S. C. Britton (Tin Res. Inst., Greenford/Middlesex, England) Chemical Abstracts 80, No. 10, 55219k (Mar. 11, 1974)

6.31 NITROGEN FIXATION ASSOCIATED WITH SEAGRASSES

McRoy, C. Peter, John J. Goering, and Barbara Chaney (Institute of Marine Science, University of Alaska, Fairbanks, AK 99701)
Limnology and Oceanography 18, No. 6, 998-1001 (Nov. 1973)

The seagrasses in shallow waters lie in dense meadows and are very productive; a large nutrient supply is necessary to maintain such growth. Other reports indicative that nitrogen fixation, by epiphytes (such as blue-green algae) on the leaves and by bacteria around the roots or sediment, suggest the manner in which nitrogen is supplied to the seagrasses. Experiments were performed to determine the nitrogen fixing ability of seagrass leaves, roots, rhizomes, and the sediments associated with the seagrasses. The seagrasses studied include turtle grass (Thalassia testudinum, manatee grass (Syringodium filiforme), and eelgrass (Zostera marina). The plants and sediments were collected from their natural environment 1 to 2 h before experiments were conducted. The turtle and manatee grasses were collected off the Keys in the vicinity of Marathon, Fla., and the eelgrass was collected near Beaufort, N.C., and in Prince William Sound, Alaska. Samples of sediment and plants were used; the roots and rhizomes were either washed or unwashed. Exposure of sediment samples to air was kept to a minimum, and the experiments were performed under oxic or anoxic conditions. Pieces of plants or small whole plants were placed in wide-mouthed jars (containing acetylene gas) inverted in a water bath. The jars were incubated in light or dark conditions at ambient temperatures for 4 to 6 h. Gas samples were withdrawn for analysis, and water volumes and plant displacements were measured. Plant and sediment samples were

4.81 SHORTENINGS, MARGARINES, AND FOOD OILS

Gillies, M. T.
Noyes Data Corporation, Park Ridge, NJ 07656 (1974), x + 333 pp.

All margarines and many shortenings may be thought of as emulsions maintained either by additives or interesterification of the constituent oils. Without the emulsifiers the texture of the oils can break down from excessive environmental conditions such as freezing or heating. The processing of oils and fats, and the addition of various agents to prevent spattering and crystallization and to provide color and flavor, has grown into a highly developed technology. This book contains descriptions of the preparation and application of fats, oils, and associated food products on a commercial scale with 174 late related process patents. The first section deals with fluid shortenings giving detailed discussions of their crystallization characteristics; emulsifiers such as glycerides, esters, tweens, and other complex combinations; mechanical processing; and other additives such as lecithin. The second section concerns plastic shortenings. These are prepared by combining a major proportion of unhydrogenated or partially hydrogenated fat with a minor proportion of an almost completely hydrogenated fat. The combination of the two fats produces a shortening of the desired consistency. The subjects covered in this section include the beta phase; mechanical processing; antispatter ingredients; emulsifiers in multipurpose shortenings; icing; cake baking, and filling applications; special formulations; and flavoring additions. The third section covers pelletized and powdered fat shortenings. Margarines and other spreads are the subjects of the fourth section. Included in the discussions

6.33 THE STUDIES ON THE EXTRACTION OF AGAR FROM GRACILARIA

Chou, Kuo-Ching (Taiwan Provincial College of Marine and Oceanic Technology)
Journal of the Fisheries Society of Taiwan 2, No. 2, 40-44 (Dec. 1973) [In Chinese; tables and abstract in English]

The higher the ratio of agarose to agaropectin in Gracilaria the better the gel strength of the agar. The higher the SO_4^{2-} content of Gracilaria the lower the gel strength of the agar.
[4 tables, 30 references] FTP

4.81

are the oils and fats used; nutritional blends; antispattering additives; whipped and fluid margarines; flavor, color, and texture modifiers; special purpose and low calorie spreads; and other emulsifiers. The fifth section covers salad oils, dressings, and mayonnaise, with descriptions of processing; crystallization inhibitors; flavored and hypocholesterolemic salad oils; mayonnaise and other dressings; low calorie salad dressings; and dressing bases. The last section covers frying and cooking oils; equipment, breakdown inhibitors, antispattering additives, and other additives for flavor, to reduce smoke, or to prevent darkening. A company index, an inventor index, and a patent index are included. SW

4.83 POLYALCOHOLS FROM FATTY ACID ESTERS (4.89)

Izumi, Manabu, and Makoto Sato (Agency of Industrial Sciences and Technology) (pat.) Japan. 73 28,401 (Sept. 1, 1973)
Chemical Abstracts 80, No. 10, 49490h (Mar. 11, 1974)

4.13 (4.19)(3.4) DIE LIPIDE IM FLEISCH UND IM ROGEN FRISCHER UND GERÄUCHERTER FISCHE [THE LIPIDS IN THE MUSCLE AND ROE OF FRESH AND SMOKED FISH]

Meizies, Anke, and Irene Reichwald (Bundesanstalt für Fettforschung, Institut für Technologie und Biochemie-H.P. Kaufmann-Institut, 44 Münster i Westf., Piusallee 68 West Germany)
Zeitschrift für Ernährungswissenschaft 12, No. 4, 248-251 (Dec. 1973). D-6100 Darmstadt, Saalbaustr. 12, Postfach 1008, West Germany. [In German; English summary]

The lipids in the muscle tissue of smoked fresh sturgeon, eel, herring, dogfish, and dusky shark were analyzed for fatty acid composition. The lipids in the roe of fresh sturgeon and lampsucker, and the smoked roe of cod were also analyzed for fatty acid composition. The results of the analyses indicate that the lipid content of fresh fish is lower than that of smoked fish; however, the composition of the lipid classes, and the fatty acid patterns of the total lipids in fresh and smoked fish are similar. The major unsaturated fatty acid in the lipid of all specimens tested was 16:0; the major monounsaturated fatty acid was 18:1. The polyunsaturated fatty acids present included 18:2, 18:3, 20:4, 20:5, and 22:6. The lipids of the fresh fish products contained more eicosapentaenoic and docosahexaenoic acids than the smoked fish products. The lipids of shark meat included substantial amounts of glycerylether diesters; lipids of shark roe contained cholesteryl esters and traces of wax esters.
[1 table, 14 references] SW

6.33 [STUDIES ON UTILIZATION OF AGAR. XI. AMYLOGRAM OF AQUEOUS AGAR SOLUTION]

Fuse, T. (Food Res. Inst., Aichi Prefecture), and F. Goto
Journal of the Agricultural Chemical Society of Japan 47, No. 2, 143-145 (1973) [In Japanese]
Food Science and Technology Abstracts 5, No. 12, 139-140, Abstract No. 12R561 (Dec. 1973)

The viscosity (amylograph measurements) of aqueous agar solutions was made at various temperatures. The apparent gelation temperature of commercial agar (16 kinds) was proportional to the water holding capacity.
[4 references] FTP

6.32 CONSTITUENTS OF A RED MARINE ALGA, ODONTHALIA CORYMBIFERA

Kurata, Kazuya, Takashi Amiya, and Kazuo Yabe (Dep. Ind. Chem., Hakodate Tech. Coll., Hakodate, Japan)
Chemical Abstracts 80, No. 9, 45452s (Mar. 4, 1974)

6.31

dried at 80° C and weighed. Nitrogen fixing ability was determined by the method of W. P. D. Stewart, G. P. Fitzgerald, and R. H. Burris [Proc. Nat. Acad. Sci. U.S. 58, 2071-2078 (1967)].

The results indicate that eelgrasses showed no nitrogen fixation under oxic or anoxic atmospheres. The turtle and manatee grasses showed low rates of nitrogen fixation in 27 of the 39 experiments. The highest rates of nitrogen fixation occurred in the leaves in the light. Rates were very low or undetectable for roots, rhizomes, and sediments, and the unwashed samples under anoxic conditions consistently gave low rates of nitrogen fixation. Based on these experiments and reports of earlier work, the authors suggest that nitrogen fixation by epiphytes is widely variable. The authors also cannot support the generalization that nitrogen fixation in the sediments is the major source of nitrogen for growth of turtle grass. In addition, measurable rates of nitrogen fixation only partially satisfies the growth requirements of seagrass, and the source of the major portion necessary for growth remains unknown.
[1 table, 10 references] SW

6.31 EFFECT OF TEMPERATURE VARIATIONS ON GROWTH, REPRODUCTION, AMINO ACID SYNTHESIS, AND FAT AND SUGAR CONTENT IN ULVA FASCIATA PLANTS

Mohsen, A. F., A. H. Nasr, and A. M. Metwalli (Alexandria Univ., Alexandria, United Arab Republic)
Chemical Abstracts 80, No. 7, 35157k (Feb. 18, 1974)

6.54 (0.6) EFFECT OF FREEZE DRYING, SPRAY DRYING, AND STABILIZERS IN FUNCTIONAL CHARACTERISTICS OF FISH PROTEIN CONCENTRATE

Rasekh, Jamshid (National Marine Fisheries Service, NOAA, College Park, MD 20740)
Journal of Milk and Food Technology 37, No. 2, 78-82 (Feb. 1974)

Fish protein concentrate (FPC) is a high-quality animal protein product suitable to incorporate into many foods and food preparations. There is little information available on the functional properties (such as wettability, among others) of FPC. The purposes of this study were to elucidate and measure the functional properties of FPC, to determine the effects of further processing on the functional properties, and to study the effects of several commercial stabilizers on the functional properties.

A slurry was made of FPC, prepared from hake extracted with isopropanol, at a level of 150 g in 650 ml of water. Commercial stabilizers were added to portions of the slurry, at the level of 2% of the dry FPC; the portions were then homogenized in a blendor for 1 min. One set of the treated portions was freeze dried, and another set was spray dried. The freeze-dried and spray-dried preparations were evaluated for pH, bulk density, wettability, suspended solids, soluble protein, water swelling index, water binding index, overrun, emulsion capacity, and emulsion stability. These properties were compared with those of soy flour and soy Promine D isolate.

The results indicate that the pH values were close to 7.0 for all FPC preparations and the soy preparations. The various stabilizers added to the preparations had little effect on the bulk density of FPC. The stabilizers did not improve the

6.71 (0.38) INDUSTRIAL APPLICATION OF MICROBIAL LIPASES: A REVIEW

Seitz, Eugene W. (International Flavors and Fragrances, Union Beach, NJ 07735)
Journal of the American Oil Chemists' Society 51, No. 2, 12-16 (Feb. 1974)

This paper contains a brief discussion of the importance of microbial lipases produced in situ in certain food products and of the application of lipase preparations to food processing, in detergent compositions, in pharmaceuticals and cosmetics, and in certain miscellaneous processes. Two processes involving lipases in fish processing are mentioned. L. Burkholder, P. R. Burkholder, A. Chu, N. Kostyk, and O. H. Roels [Food Technol. 22, 76 (1968)] demonstrated an enzymatic method for removing excessive fat from menhaden fish. Candida lipolytica and Geotrichum candidum were used to reduce the lipid content of menhaden and to increase the protein level in the final product. Apparently the organisms released lipases, the yield of which could be controlled by adjusting the growth conditions. The process also produced a product having pleasant and appealing flavor characteristics. Some data are shown in the table that follows.

Another example of the use of lipase for fish was that described in Japanese patent 9,225 (1971) involving a process for the preparation of smoked carp. In this process carp are steeped in a brine for about 2 weeks and then in a lipase solution for 4-5 h. The carp are then smoked.

6.54 (8.0)(8.42) FISH PROTEIN CONCENTRATE AS A MINERAL NUTRIENT SOURCE

Hoskins, Fred H. (Dept. of Food Science, Louisiana State University, Baton Rouge, LA 70803), and Javier Loustaunau
Food Technology 28, No. 3, 58-60, 62 (Mar. 1974)

Data are presented on the mineral content and proximate composition of fish protein concentrates (FPC) prepared from four species of Louisiana and Gulf of Mexico fish: bluegill (freshwater species), threadfin shad, spade fish, and croaker. The FPC's were prepared by extracting the ground whole fish three times with isopropyl alcohol (91% alcohol by volume). The extracted product was milled and screened. Three samples were taken for each species: (1) the raw ground whole fish, (2) the final FPC sieved product of particle size greater than 100 mesh, and (3) the final FPC sieved product of particle size less than 100 mesh. The proximate composition data consisted of moisture, solids, protein, fat, and ash content. Data on the mineral content are shown in the table that follows. The data indicate that the FPC products are good dietary sources of calcium, phosphorus, iron, and magnesium.
[2 figures, 4 tables, 10 references] FTP

7.0 (9.19) ANALYSIS OF THE POLYCHLORINATED BIPHENYL PROBLEM. APPLICATION OF GAS CHROMATOGRAPHY-MASS SPECTROMETRY WITH COMPUTER CONTROLLED REPETITIVE DATA ACQUISITION FROM SELECTED SPECIFIC IONS

Eichelberger, James W., Lawrence E. Harris, and W. L. Budde (Environmental Protection Agency, National Environmental Research Center, Cincinnati, OH 45268)
Analytical Chemistry 46, No. 2, 227-231 (Feb. 1974)

Polychlorinated biphenyls (PCBs) are widely distributed environmental contaminants. Qualitative and quantitative analyses of mixtures of PCBs are complicated by the large number of possible isomers and by their physical and chemical similarity to the chlorinated hydrocarbon pesticides DDT, DDE, lindane, and dieldrin. Analytical detection and separation of these materials is difficult. The qualitative information yielded by detector responses in the reported procedures using gas chromatography is inadequate. Mass spectrometer monitoring techniques were evaluated in seeking a procedure that would be sufficiently sensitive, eliminate the need for elaborate separations, and would not sacrifice too much qualitative information.

The previously reported development of a digital computer controlled quadrupole mass spectrometer suggested the possibility of program controlled data acquisition with sampling of specific ions, sequences of ions, and varying dwell times on each. Data acquisition from subsets of the ions used in conventional procedures should enhance sensitivity without loss of information. A system was

6.54 (8.0)(8.42)

Fish species Product	Mineral composition [1]							
	Ca	P	Mg	K	Fe	Mn	Zn	Na
	%	%	%	%	%	p/m	p/m	%
Bluegill								
Raw whole fish	6.0	3.2	0.2	0.7	0.07	28.4	114.5	0.31
FPC, coarse [2]	14.4	7.1	0.3	0.6	0.03	35.8	132	0.44
FPC, fine [3]	4.1	2.3	0.2	0.5	0.08	32.4	175	0.19
Threadfin shad								
Raw whole fish	3.3	1.8	0.1	0.4	0.25	76.9	103	0.18
FPC, coarse [2]	5.7	2.9	0.2	0.5	0.34	104	146	0.20
FPC, fine [3]	5.1	2.9	0.2	0.6	0.44	129	192	0.18
Spade fish								
Raw whole fish	4.1	2.3	0.1	0.5	0.08	58.2	63.2	0.32
FPC, coarse [2]	8.5	4.7	0.3	0.3	0.05	80.6	78.8	0.33
FPC, fine [3]	4.2	2.6	0.2	0.3	0.12	69.8	107.5	0.22
Croaker								
Raw whole fish	3.0	2.0	0.1	0.7	0.02	52.9	39.4	0.23
FPC, coarse [2]	8.9	4.9	0.2	0.9	0.02	108	75.5	0.34
FPC, fine [3]	3.6	2.3	0.1	0.7	0.03	68.9	62.2	0.22

[1] Analysis of the ash.
[2] Final product: particle size >100 mesh.
[3] Final product: particle size <100 mesh.

6.54 (0.6)

wettability of the FPC preparations except for slight improvement with Tween 80. The stabilizers gave freeze dried FPC samples slightly higher values for suspended solids than they gave the sprayed, dried, or control FPC samples. Soy flour and soy isolate had substantially higher suspended solids values than the FPC samples. The stabilizer Myvoplex 600 caused the freeze-dried FPC to have a maximum soluble protein of 7.1% compared to a maximum of 6.6% with CMC in the spray-dried FPC. All FPC samples gave lower soluble protein values than did the soy preparations. Emulsion capacity of FPC improved slightly with freeze-drying alone, and improved more with the addition of CMC stabilizer. All FPC samples had a lower emulsion capacity than the soy preparations. All FPC samples, untreated and treated with stabilizers, had poor emulsion stability. The water swelling index and the water binding index improved by freeze- or spray-drying. Spray-dried samples gave higher values for the water swelling index. The addition of stabilizers did not increase either index. Neither spray-drying nor freeze-drying improved the overrun of the samples; however, addition of Tween 80 was effective in increasing the overrun after whipping.
[5 tables, 16 references] SW

7.0 (9.19)

devised which used subset data acquisition with a minicomputer controlled quadrupole mass spectrometer. The system was equipped with a gas chromatograph inlet system and was the basis for a highly sensitive analytical procedure for the detection of PCBs in the environment.

The new method was evaluated using PCBs mixed with DDT, DDE, DDD, and dieldrin--a mixture likely to be found in a solvent extract of an environmental sample. The method was also tested with a sediment sample from an Ohio lake. The results of the evaluations, the authors suggest, indicate that the method is well suited to the analysis of PCBs in the environment and is adaptable to the analyses of other environmental contaminants such as petroleum products. The article contains selected chromatograms that show PCBs distinct from each other, from mixtures with pesticides, and from lake sediments. Mass numbers and subset masses related to the different compounds are also given.
[6 figures, 3 tables, 10 references] SW

6.71 (0.38)

Reduction of the fat content of menhaden by cultivation of Geotrichum candidum on medium containing the whole ground lyophilized fish

Incubation time [1]	Fat in mature fish	Fat in immature fish
h	%	%
0	41.8	9.9
24	37.4	8.8
48	36.8	8.0
72	36.5	6.9
96	33.7	6.5

[1] Growth medium (pH 7.0) contained 6.25% whole ground lyophilized menhaden. Incubation was at 30° C on a rotary shaker at 140 r/min.

[2 tables, 54 references] FTP

7.42 A SIMPLIFIED METHOD FOR DETERMINATION [OF] THE CONCENTRATION OF ZINC IN AQUATIC ANIMALS

Jeng, Sen-Shyong (Institute of Zoology, Academia Sinica, Nankang, Taipei, Taiwan)
Journal of the Fisheries Society of Taiwan 2, No. 2, 45-47 (Dec. 1973)

One of the most common methods for determining zinc in foods involves the use of atomic absorption spectrometry (Methods of Analysis of the Association of Official Analytical Chemists). The wet-ashing procedure of the AOAC method requires 2 to 3 h. In this paper, the author describes a wet-ashing method of semimicro amounts of sample that permitted completion of the entire analysis within 1 h. The results obtained were comparable to those obtained by the standard method.

The wet-ashing procedure was as follows: weigh 0.1-0.2 g sample into a 5 ml Kjeldahl flask. Add 0.5 ml H_2SO_4 and swirl until the reaction mixture subsides. Add HNO_3 dropwise to maintain oxidizing conditions and until the solution becomes colorless. Heat sample to remove remaining HNO_3. Wet-ashing requires about 10 to 20 min. The cooled sample is made up to 5 ml in the digestion flask, and the zinc then is determined by atomic absorption spectrophotometry.
[2 figures, 1 table, 4 references] FTP

8.53 CHEMICAL AND NUTRITIVE VALUES OF SEVERAL FRESH AND CANNED FINFISH, CRUSTACEANS, AND MOLLUSKS. PART II. FATTY ACID COMPOSITION

Bonnet, James C., Virginia D. Sidwell, and Elizabeth G. Zook (National Marine Fisheries Service, NOAA, College Park, MD 20740)
Marine Fisheries Review 36, No. 2, 8-14 (Feb. 1974)

The total fat and the fatty acid composition of finfish (fresh and canned), crustaceans, and mollusks are presented in this report. Samples were analyzed of 11 commonly marketed fresh finfish such as catfish, cod, and whiting; canned salmon and tuna; 7 fresh crustaceans including crabs, lobster, and shrimp; and 7 mollusks comprising clams, an oyster, and scallops. Total fat was determined from samples of edible muscle. The fatty acids were identified and quantified after conversion to their methyl esters using techniques of chromatography.

The results indicate that the total fat content of fresh finfish ranges from 0.35% (icelandic cod) to 4.86% (halibut). Tuna, canned in oil, contained the highest level of total fat; canned in brine, the fat content was much lower. The fat content in canned salmon was high. The levels of fat in mollusks and crustaceans were low.

The fatty acid composition of the finfish, crustaceans, and mollusks are listed. The wide range of each fatty acid in finfish is attributed to their physiologic status, diet, and age. Unsaturated fatty acid levels ranged from 58% in wild catfish to 81% in ocean perch. There was little difference in the fatty acid

8. (0.7) COMPOSITION OF THE EDIBLE PORTION OF RAW (FRESH OR FROZEN) CRUSTACEANS, FINFISH, AND MOLLUSKS. I. PROTEIN, FAT, MOISTURE, ASH, CARBOHYDRATE, ENERGY VALUE, AND CHOLESTEROL

Sidwell, Virginia D., Pauline R. Foncannon, Nancy S. Moore, and James C. Bonnet (College Park Fishery Products Technology Laboratory, National Marine Fisheries Service, NOAA, College Park, MD 20740)
Marine Fisheries Review 36, No. 3, 21-35 (Mar. 1974)

Considerable data have been published on many aspects of the chemical and nutritional values of fish and fishery products, but at no time have appreciable amounts of these data been assembled in a tabular form. If the data were so assembled and characterized, then industry, medical services, and the general public would have a good reliable source of information on the composition of fish. For example, industry will need these data for putting nutritional information on labels of canned fish or fishery products. Today, doctors and dietitians are especially interested in the content of the various lipid materials in foods since these fatlike substances of an individual's diet may be involved in the degeneration of the vascular system.

This paper is an interim report on protein, fat, moisture, ash, carbohydrate, energy value, and cholesterol. Other interim reports will deal with the vitamins, minerals, fatty acids, and amino acids. The need for these data is so urgent that we prefer not to wait until the review of literature is completed.

Our primary objectives are: (1) to develop a comprehensive data bank on the chemical and nutritional composition of fish and fishery products; (2) to publish,

9.10 (9.2) BIOECONOMIC CONTRIBUTION OF COLUMBIA RIVER HATCHERY COHO SALMON, 1965 AND 1966 BROODS, TO THE PACIFIC SALMON FISHERIES

Wahle, Roy J., and Robert R. Vreeland (Columbia River Fisheries Program Office, National Marine Fisheries Service, NOAA, 811 Northeast Oregon St., Portland, OR 97208), and Robert H. Lander
Fishery Bulletin 72, No. 1, 139-159 (Jan. 1974)

Use of the Columbia River has expanded tremendously in the past 30 years through Federally financed and/or licensed water use projects. This expansion has depleted valuable stocks of Pacific salmon, Oncorhynchus spp., and steelhead trout, Salmo gairdneri, through the loss and deterioration of natural stream habitat. Therefore, mitigative measures--hatcheries, fish ladders, and spawning channels--to supplement the declining natural production of Columbia River salmon and steelhead trout have been Federally funded. The objectives of this study were to (1) to estimate the contribution (catch) to Pacific salmon fisheries during 1967, 1968, and 1969 for the 1965-1966 brood coho salmon hatchery releases and (2) develop benefit/cost values for these two broods. The design and operations of the salmon marking and release procedures are also described.

Marked coho salmon, Oncorhynchus kisutch, smolts of the 1965 and 1966 broods were released from 20 hatcheries on four sections of the Columbia River and tributaries. Commercial and sport fisheries in marine waters from Pelican, Alaska, to Avila Beach, Calif., and on the Columbia River were sampled during 1967-69 for marks.

8. (0.7)

as completely as possible, information on the nutrients found in fishery products; and (3) to point out areas in the chemical composition of fish needing further investigations.

The title of the article reviewed, name of the author, and publication were obtained from bibliographies or abstracts. Copies of the original article were obtained from the National Agricultural Library, U.S. Department of Agriculture; the National Library of Medicine, U.S. Department of Health, Education and Welfare; the Natural Resources Library, U.S. Department of the Interior; or from universities and other research libraries. No data are put in the bank unless we have a copy of the original article on file.

Table 1 [in the report] lists the values for the overall average for protein, fat, moisture, ash, carbohydrate, energy, and cholesterol; the range of the averages used to compute the mean and standard error of the mean; and also the number of averages used in the computation for 154 different fish. This review contains data from 155 references.

[2 figures, 1 table, 155 references] Extracted

9.10 (9.2)

The net value of the estimated total catch of hatchery fish was calculated after adjusting for the effects of marking. Also estimated for each brood were the total costs of rearing including amortized capital outlay. Total benefits of $8.58 million for the 1965 brood and $9.11 million for the 1966 brood were estimated as applicable to normal production years when no marking takes place. Corresponding costs were estimated as $1.29 million for the 1965 brood and $1.23 million for the 1966 brood. Estimated benefit/cost ratios for the 20 Columbia River coho salmon hatcheries, as operated under production regimes prevailing during the study, may prove useful in decisions affecting management policies. The ratios are 6.6/1 for the 1965 brood, 7.4/1 for the 1966 brood, and 7.0/1 for both broods combined.

[2 figures, 8 tables, 19 references]

[Authors' abstract and text in part; also partly abstracted]

7.59 DETERMINATION OF BENZO(A)PYRENE IN SMOKE CONDENSATES BY HIGH PRESSURE RAPID LIQUID-LIQUID CHROMATOGRAPHY

O'Hara, James R., M. S. Chin, B. Dainius, and John N. Kilbuck (Stange Co., 342 N. Western Ave., Chicago, IL 60612)

Journal of Food Science 39, No. 1, 38-41 (Jan.-Feb. 1974)

Some polycyclic aromatic hydrocarbons (PAH) (such as benzo(a)pyrene, dibenz-(a,h)anthracene) are carcinogens. PAH's may be formed during woodsmoking in the preparation of smoked foods or smoke flavors and liquid smokes. Therefore, a rapid, reliable method for determining PAH's in smoked foods and smoke products is essential. The present method for the analysis of benzo(a)pyrene in smoke condensates has a lengthy sample preparation step followed by spectrophotometric estimation of the chemical. The authors developed a more efficient method in which the benzo(a)pyrene is extracted from the smoke condensate, washed with acid and alkaline solutions, eluted from a Florisil column, isolated by preparative thin-layer chromatography, and estimated by liquid-liquid chromatography at 254 mμ. The recovery of benzo(a)pyrene was from 60% to 88%.

[9 figures, 13 references] FTP

8.53

composition of the crustaceans. Of the mollusks, oysters and clams contained more unidentifiable fatty acids than did the scallops.

The report includes tables on the total fat content and 31 fatty acids of the finfish and mollusks. Fat content and 21 fatty acids in the crustaceans are listed.

[6 tables, 5 references] SW

9.1 SCHOOLING IN THE ECOLOGY OF FISH (9.6)

Radakov, D. V.

Published in Moscow, U.S.S.R. (1972). Translated from Russian by H. Mills. Halsted Press Div., John Wiley and Sons, Inc., New York, N.Y. (1973), vi + 173 pp.

This book contains data on the schooling of fish. The phenomenon is suggested to be a form of social life and a means for a species to adapt to changing conditions. The first chapter covers observations of fish behavior from the air, as seen underwater, and with acoustical instruments. The main theoretical views on schooling behavior are also described. The second chapter covers the methods for conducting observations and experiments. The third chapter includes the characteristics and biological significance of fish schools. Details are provided on the external features of a school; the role of vision and other receptors; agitation and movement in schools; imitation, stimulation, learning, and schooling mechanisms; situations of danger and hunting; and other emergency situations. The fourth chapter gives theoretical aspects of schooling and practical applications in a fishery. The book contains a 15-page bibliography and a subject index. SW

9.10 MONITORING LIFE IN THE OCEAN.
REPORT OF WORKING GROUP 29 ON MONITORING IN BIOLOGICAL OCEANOGRAPHY. LA JOLLA, 1970 PLYMOUTH, 1972

Anonymous
UNESCO Technical Papers in Marine Science No. 15, SCOR-ACMRR-UNESCO-IBP/PM (1973), 71 pp. [UNIPUB, Inc., P.O. Box 433, New York, NY 10016, is the United States distributor for publications of United Nations Educational, Scientific and Cultural Organization (UNESCO)]

The effects of technological stress upon marine animals and plants are cause for increasing concern because they may be of consequence to human welfare. Many long-term monitoring programs of life in the ocean in support of biological oceanography or fishery management are now important because they also may be used to search for indicators of the effects of technological stress in the oceans. This article is a review of the status of the technology and strategy of monitoring in biological oceanography. The review was prepared in the hope that it will assist those who are concerned with the policy and design of ocean monitoring programs to evaluate new proposals, to initiate new projects themselves, and to support the continuation of current programs. In addition, this review was prepared for persons in high technology areas in order to introduce them to the unfamiliar, practical problems inherent in work at sea. The subjects covered in the review are as follows. Objectives of ocean monitoring: biological oceanography, fisheries

9.10 CHEMICAL SIGNALS IN THE SEA: MARINE ALLELOCHEMICS AND EVOLUTION

Kittredge, J. S. (Marine Biomedical Institute, University of Texas Medical Branch, Galveston, TX 77550), Francis T. Takahashi, James Lindsey, and Reuben Lasker
Fishery Bulletin 72, No. 1, 1-11 (Jan. 1974)

Evidence from the literature supports Haldane's premise that chemical communication is the most primitive form of communication and thus the lineal predecessor of synaptic transmission and hormone function. Transducers of environmental chemical information have likely evolved in response to the metabolic products released by their prey and by competitive organisms. This coevolution of "natural products" and the respective transducers has existed from the earliest metabolic product that happened to be a membrane irritant to the present. We thus consider it likely that most of the "natural products," not only of terrestrial plants, but also of marine plants and invertebrates, function as allomones, kairomones, or pheromones. D. J. Faulkner and R. J. Anderson [In press. Natural products chemistry of the marine environment. In D. E. Goldberg (editor). The sea. Vol. V, John Wiley and Sons, N.Y.] have provided a review of the chemistry of the "natural products" of marine organisms.

Conceptually, in such a "chemical environment" the most effective protection from a predator would be a "cryptic odor," an irritant that disrupts chemoreception. These cryptic odors may be released into the environment, as is the active component of octopus ink, they may exist in the epidermal tissues or glands where they would function at the inception of attack, or they may be contained in the

9.12 (9.19) BLOOD GLUCOSE: A SENSITIVE INDICATOR OF ENVIRONMENTAL STRESS IN FISH

Silbergeld, Ellen K. (Stroud Water Research Center, Academy of Natural Sciences of Philadelphia, Avondale, Pa.)
Bulletin of Environmental Contamination and Toxicology 11, No. 1, 20-25 (Jan. 1974)

A study was made of the use of blood glucose levels as a possible sensitive indicator of environmental stress in fish. The fish used was the johnny darter Etheostoma nigrum Rafinesque. The stress condition involved exposure of the fish to sublethal levels (2.33 ppb) of dieldrin for 30 days. The mean level of exposure was slightly less than one-fourth of the LD50 for the species. Glucose level measurements were made on the fish taken from a stream and on the fish exposed to the insecticide. The method of W. Chavin and J. E. Young [Comp. Biochem. Physiol. 33, 629 (1970)] was adapted for analyzing the glucose level in the fish blood. Untreated fish (controls) held under the same conditions as the treated fish were analyzed at the same times.

The initial level of blood glucose in both groups (control and treated) was about the same, 60 mg of glucose per 100 ml blood. After 5 days, the treated (exposed to dieldrin) fish showed a blood glucose level of 98.3 mg/100 ml; the blood glucose level of the control group did not change significantly. After 15 days, the exposed fish showed a blood glucose level not significantly higher than the mean level found initially in both groups. However, the mean blood glucose level of the treated fish remained significantly higher than that of the control group,

9.14 (0.6) EFFECT OF DIETARY BIOTIN AND LIPID ON GROWTH, STAMINA, LIPID METABOLISM AND BIOTIN-CONTAINING ENZYMES IN BROOK TROUT (SALVELINUS FONTINALIS)

Poston, Hugh A., and Thomas H. McCartney (Tunison Laboratory of Fish Nutrition, U.S. Bureau of Sport Fisheries and Wildlife, Cortland, NY 13045)
Journal of Nutrition 104, No. 3, 315-322 (Mar. 1974)

Earlier work has shown that the type and level of dietary fat can mask the effects of biotin deficiency in chicks. Various other workers have established that salmonids require biotin for normal appetite, growth, and dermal and muscle condition, and that rainbow trout evidenced no deficiency syndrome fed a diet containing 0.01 p/m biotin and 5% soybean oil. Information on the metabolic interrelationships between biotin deficiency and dietary fat are contradictory and unclear. The present study was designed to determine the effects of dietary biotin and fat on the growth, feed conversion, swimming stamina, carcass and liver levels, and liver fatty acid composition of juvenile brook trout. The authors also examined the activities of two biotin-containing liver enzymes, acetyl CoA carboxylase (ACC) and pyruvate carboxylase (PC) in the same four dietary groups (see below) of trout. It is noted that ACC is considered the initial and rate-limiting enzyme in fatty acid synthesis for nonaquatic animals and PC is involved in supplying four-carbon units for gluconeogenesis and in replenishing tricarboxylic acid cycle intermediates. Eight-month-old brook trout (initial mean body weight of 1.2 g) were reared for 20 weeks in circular tanks of 8.3° C well water at 7.6 liters/min flow. Two groups of trout were fed one of the following diets: (1) basal diet; (2) basal diet plus 6 p/m biotin (dry basis); (3) basal diet plus 9 g

9.10

eggs or larvae. Most sessile marine invertebrates reproduce by epidemic spawning, the simultaneous release of the gonadal products of an entire local population of a species. Most sessile marine invertebrates are also filter feeders. The prime advantage of epidemic spawning is the enhancement of fertilization. However, in the densely populated benthic environment, a heavy loss of eggs or larvae to filter feeders may occur. The presence of a "feeding inhibitor" in the eggs or larvae would reduce such losses.

The evidence for chemical cooperation, from gamones to sex pheromones, suggests a pattern of increasing complexity in the function of chemical cues. The behavioral response of even a "simple" crustacean to a chemical gradient appears to involve at least some short term "memory" or a type of "chemical-spatial" sense that we have not observed in such clear-cut form in any other organism.

The study of the chemical ecology of the marine environment is scarcely in its infancy. The chemical characterization of some of the intraspecific and interspecific messages in the sea and the physiology of their perception are challenges. Solutions to these paired problems will provide insights into the evolution of chemical transduction and perhaps expose a hierarchy of perception from membrane irritation to synaptic transmission.

[3 figures, 68 references] Authors' summary in major part

9.10

management, and pollution; methods of observation: research vessels, ships of opportunity, stationary platforms, and satellites; strategy and statistical design in monitoring: general design problems and primary, secondary, and tertiary production; feasibility of techniques: data handling, sensors of chlorophyll, measurement of primary production, particle sizing and counts, remote sensing, biological assays and sensors, plankton sampling and recording from towed bodies and data buoys, and hydroacoustic techniques.

The recommendations made in this review include more critical reviews in towed body systems for deployment from ships of opportunity; automation of plankton sorting, counting, and identification; strategy for sampling and analytical procedures in monitoring; and reviews of the status of monitoring techniques in biological oceanography at intervals of 2 to 5 years.

A list of the organizations and their representatives who participated in the preparation of this review is included.

[3 figures, 4 tables, 90 references] SW

9.14 (0.6)

partially hydrogenated soybean oil in each 100 g of diet; and (4) basal diet plus biotin and partially hydrogenated soybean oil (complete diet). Growth of the trout was measured by weighing the fish biweekly. After the 20th week, the whole fish carcasses were analyzed for water, fat, ash, and protein. The livers were analyzed for total lipids, for fatty acid composition, and for ACC and PC enzyme activity. In addition, swimming stamina of the live brook trout under controlled water velocities was estimated.

Simultaneous dietary fat and biotin deficiencies in brook trout suppressed weight gain, feed/gain efficiency, swimming stamina, and total liver lipids. Dietary fat alone reduced body water, increased body fat and ash, reversed the elevating effect of biotin plus fat on liver palmitic and stearic acids, and widened the 16:0 to 16:1, 18:0 to 18:1, 18:2 to 20:4 and 18:3 to 22:5 liver fatty acid ratios. Fat also accentuated the accumulation of liver oleic and linoleic acids caused by biotin deprivation and apparently prevented docosapentaenoic acid biosynthesis in biotin-deprived trout. Fish fed fat with no biotin had the least, and those fed biotin with no fat the most, liver ACC and PC activities. Those fed neither supplemental biotin nor fat and those fed both showed equal liver ACC activity.

These results indicate that brook trout require biotin for lipogenesis, glugoneogenesis, normal feed consumption and conversion, and sustained swimming stamina. Furthermore, depression of liver ACC activity and elevated precursor/product liver polyunsaturated fatty acid ratios in biotin-deprived trout fed fat are indications that partially hydrogenated soybean oil obscured biotin deficiency symptoms in brook trout.

[5 tables, 35 references] Partially abstracted; partially reprinted

9.12 (9.19)

measured at the same time. After 30 days, the blood glucose level of the control group declined from about 60 mg/100 ml to 46 mg/100 ml on the 30th day.

Thus, the fish showed significant increases in blood glucose levels (up to 133% of control levels) after 5 days of treatment with 2.33 ppb dieldrin. However, apparently the fish did adapt to dieldrin because by the 15th day the blood glucose level returned to the initial value. Nevertheless, the metabolism of the fish must have been altered because the blood glucose levels in the treated fish remained significantly higher than that in the control group.

[2 figures, 13 references] FTP

9.16 (1.85)(6.37) ON THE INFLUENCE OF FUCUS SPIRALIS L., AS A SOURCE OF ORGANIC MATTER, IN THE LARVAL REARING OF THE PRAWN PALAEMONETES VARIANS LEACH (DECAPODA, CARIDEA)

De Figueiredo, Maria José
Boletim Informativo No. 11 do Instituto de Bioligia Maritima, Ministério da Marinha, Cais do Sodré, Lisbon 2, Portugal (Mar. 1973), 7 pp. [In English]

Because the prawn P. varians Leach is abundant in Portugal and easy to rear in the laboratory, it was used in earlier studies on feeding of aquatic animals in aquaculture. In related experiments on larval culture, the use of the brown seaweed F. spiralis L. as food for the parent prawns appeared to shorten the development period of the larval prawns. To test this effect, larvae of the prawn were placed in tanks of filtered, aerated, sterilized, circulating seawater. Half the number of tanks were maintained at a temperature of about 15° C and the other tanks were held at 27° C. Fronds of the brown seaweed were added to some of the tanks; nauplii of Artemia salina and pure cultures of Tetraselmis suecica or Isochrysis galbana (two species of algae) were added to all the tanks. The tanks were inspected daily and records were kept of the succession of larval stages of the prawn.

The results indicate that at the lower temperature, the larval life stages of the prawn lasted more than 3 weeks, and the intermolt periods were 3 to 4 days. At the higher temperature, the larval life stages were complete in 9 or 10 days and intermolt periods were only about 1½ days. In addition, in the presence of brown seaweed in tanks at the lower temperature the intermolt periods of the larvae were slightly shortened, and 96% of the original population passed into the

9.16 SYLLABUS OF FISH HEALTH MANAGEMENT.
I FISH CULTURE METHODS
II FISH DISEASE DIAGNOSIS

Klontz, George W. (Fisheries Management, College of Forestry, Wildlife and Range Sciences, University of Idaho, Moscow, Idaho)
Sea Grant Report TAMU-SG-74-401, Texas A. & M. University, College Station, Tex. (Dec. 1973), Part I: x + 54 pp.; Part II. iv + 165 pp. Price $10.00. [Available from the Dept. of Marine Resources Information, Center for Marine Resources, Texas A. & M. University, College Station, TX 77843.]

Part I is the base from which the author presented week-long courses in fish health management. It contains the following subject matter areas: Fish Culture: Fish culture (husbandry) in the United States; Types of fish husbandry; Types of fish rearing facilities; Basic constituents of a fish rearing facility; Rearing of cold-water fish (intensive fish husbandry); Rearing of warmwater fish; and Rearing of marine fish. Fish Nutrition: Dietary constituents--salmonids; Dietary constituents--channel catfish; Feed ingredients; Feeding methods; and Carrying capacities (pond loadings). [2 figures, 15 tables, 41 references]

Part II dealing with fish disease diagnosis contains the following subject matter areas: Principles of epidemiology of fish diseases; Diagnostic methodology; Treatment and control of fish diseases; Bacterial diseases of fish; Virus diseases of fish; Mycotic diseases of fish; Parasitic diseases of fish; Taxonomy of fish parasites; Environmental diseases of fish; Nutritional diseases of fish; Neoplastic diseases of fish; Idiopathic diseases of fish; and Bibliography. Appendix I

9.16 PHASE FEEDING FOR CATFISH

Hastings, W. H. (Bureau of Sport Fisheries and Wildlife, Fish Farming Experimental Station, Stuttgart, AR 72160)
Progressive Fish-Culturist 35, No. 4, 195-196 (Oct. 1973)

The author presents continued evidence of increased catfish production through use of high amounts of protein in their diet. Further, he found that phase feeding (adjusting the protein level of the diet relative to water temperature of the ponds) may be more profitable.

> Second-year channel catfish fingerlings of 30 grams average weight were stocked at the rate of 2,000 per acre in 0.25-acre ponds. Triplicate ponds were assigned to each of five different feeding programs and continued during a 6-month growing season . . . . One group of fish received feed calculated to contain 25 percent protein, one group received 30 percent protein feed, and another a 35 percent protein feed. A fourth group received feed containing 25 percent protein during the period when water temperature was less than 24° C (75° F), 30 percent protein feed while water temperature was between 24° C and 27° C (75°-80° F), and 35 percent protein feed in water warmer than 27° C (80° F). This "phase feeding" was reversed in the fall as water temperatures decreased. . . . . A fifth group of fish received a special feed containing 30 percent protein formulated with fish meal as the only animal protein.

9.17 (1.32)(1.0112) FORECAST OF THE SOCKEYE SALMON RUN TO BRISTOL BAY IN 1974

Rogers, Donald E.
Circular 74-1, Fisheries Research Institute, College of Fisheries, University of Washington, Seattle, WA 98195 (Jan. 25, 1974), 30 pp.

Accurate forecasts of the magnitude of the annual sockeye salmon runs to Bristol Bay (Alaska) are important to the fishing industry in preparation for processing the fish; management in regulation of fishing effort during the run also depends upon an accurate forecast. The runs occur during a period beginning in late June and ending in mid-July and they have varied in magnitude between 2 and 53 million fish over the past 14 years. A forecast of this run has been made annually since 1960. The forecasts are based upon the relationships between the average purse seine catch of immature sockeye salmon (ages .1 and .2) south of Adak Island in year N and the subsequent run of mature salmon (ages .2 and .3) to Bristol Bay in year N+1. The Bristol Bay runs can also be predicted from relationships between the abundance of mature fish and the abundance of fish at some earlier stage in their life history; for example, the abundance of parent spawners, or juveniles in the lakes, or smolts leaving the major lake systems. These relationships exhibit greater variation than relationships between immatures at Adak and adults returning 1 or 2 years later. This report presents a forecast of the sockeye salmon run to Bristol Bay in 1974; in addition, examination of the variation in catches of immature fish at Adak and some pertinent environmental statistics for Bristol Bay sockeye salmon are also presented.

9.16

The results are summarized in the following table.

Catfish production and cost data calculated on a per-acre basis

Item	Feeding program				
	25% Protein	30% Protein	35% Protein	Phase Feeding	Special
Number of fish harvested	1,837	1,728	1,867	1,746	1,801
Weight harvested (lb)	2,059	2,160	2,393	2,328	2,235
Protein fed (lb)	756	868	980	884	840
Feed conversion	1.48	1.40	1.25	1.27	1.34
Protein efficiency	2.54	2.32	2.30	2.49	2.50
Cost feed/lb gain	$0.072	$0.074	$0.071	$0.068	$0.077
Income (fish-feed)*	$583.89	$606.20	$679.47	$665.28	$621.41
Protein by analysis (%)	27.0	31.0	35.0	--	30.0

* Income (fish-feed) = proceeds from selling fish at $0.35/lb minus cost of feed.

[3 tables, 4 references]

Extracted; edited

9.17 (1.32)(1.0112)

The predicted abundance of the 1974 run to Bristol Bay by age groups is as follows:

Age	Numbers of fish (millions)	Percentage of run
1.2	0.46	11.8
2.2	2.84	72.8
subtotal	3.30 (1.0, 5.6)*	84.6
1.3	0.35	9.0
2.3	0.25	6.4
subtotal	0.60 (0.9, 2.1)*	15.4
Total	3.90 (1.2, 6.6)*	

* 80% confidence limits in parenthesis.

The predicted total run of 3.9 million fish in 1974 assumes an average proportion of Bristol Bay sockeye salmon will be caught by Japanese high-seas fishing in the spring of 1974.
[6 figures, 3 tables, 4 references, 14 tables in appendix]

SW

9.16 (1.85)(6.37)

postlarval stage between 22 and 28 days. The combined effect of the higher temperature in the other tanks and the presence of organic matter issuing from the culture of brown seaweed resulted in a population of healthy postlarval prawns; furthermore, these prawns passed regularly through a minimum number of larval stages, in the least time, and with low mortality compared to prawns grown in the tanks at the same temperature without the presence of brown seaweed. The author suggests that the organic substances provided by the brown seaweed acted as a supplement to the dietary A. salina normally accepted as the better food for decapod larvae and benefited the larval development of P. varians Leach.
[1 table, 14 references]

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9.16

contains a case history form, a fish examination form, and a list of possible causes of fish diseases based upon clinical signs. Appendix II contains descriptions of biochemical tests for identification of bacteria. Appendix III is a description of the staining techniques for fish blood.
[Profusely illustrated, 8 tables, 5 references]

FTP

9.15 (9.16)(0.4) ANTHELMINTICS FOR NEMATODE PARASITES OF FISH. I. CONTROL OF STERLADOCHONA PEDISPICULA IN SALMO GAIRDNERII BY DIETHYL 2-CHLOROVINYL PHOSPHATE AND 2,2-DICHLOROVINYL DIMETHYL PHOSPHATE PELLETS

Meggenti, A. R. (Dep. Nematol., Univ. California, Davis, Calif.)
Chemical Abstracts 80, No. 9, 43915v (Mar. 4, 1974)

9.16 PREPARATION AND PROPERTIES OF QUINALDINE SULFATE, AN IMPROVED FISH ANESTHETIC

Allen, John L., and Joe B. Sills (Fish Control Lab., La Crosse, Wis.)
Chemical Abstracts 80, No. 8, 41008d (Feb. 25, 1974)

9.19 (0.5)(9.17) COMPARATIVE ANALYSIS OF MODELING TECHNIQUES FOR COLIFORM ORGANISMS IN STREAMS

Mahloch, Jerome L. (Mississippi State University, State College, MS 39762)
Applied Microbiology 27, No. 2, 340-345 (Feb. 1974)

Currently an integral part of river basin management involves the use of models for predicting changes in water quality parameters. Presence of coliform organisms in natural waterways is generally considered as evidence of pollution by animals and humans. Although models for use in describing coliform populations are available, their use is just beginning because of the complexities involved and the lack of definitive information on coliform populations in natural environments. Deterministic and statistical models are used for describing coliform populations. The former present an exact mathematical relationship between coliform population and a given set of variables; the latter present a probabilistic relationship between coliform population and a given set of variables. The purpose of this study was to summarize the state of art for modeling coliform organisms in natural waterways and to make a comparative analysis between deterministic and statistical models. In the context of this study, the term "modeling" meant the predicting of coliform populations using a prescribed model, and fitting the model to observed data. Three models of each type were analyzed and were applied to coliform data on the Leaf River in the Pascagoula River Basin of southeastern Mississippi.

9.19 (9.3) INTERNATIONAL APPROACH TO THE MARINE POLLUTION PROBLEM

Waldichuk, Michael (Pacific Environment Institute, 4160 Marine Dr., West Vancouver, British Columbia, Canada)
Ocean Management 1, No. 3, 211-261 (Nov. 1973)

Attempts to control marine pollution by international agreement began as early as 1926. The first successful agreement was the Convention for the Prevention of Pollution of the Sea by Oil, adopted in 1958 in Washington, D.C. Under this agreement intentional discharges of oil into the sea were prohibited within 50 miles of land. Under the auspices of the Inter-Governmental Maritime Consultative Organization (IMCO) another conference was held in London in 1962 to amend the 1958 convention. By this later agreement the prohibited zone for dumping oil was extended to 100 miles from land.

There are various international agencies dealing with the scientific aspects of marine pollution. These agencies include Inter-Governmental Oceanographic Commission (IOC) of the United Nations Educational, Scientific and Cultural Organization (UNESCO), International Atomic Energy Agency (IAEA), Food and Agriculture Organization (FAO), and World Meteorological Organization (WMO). These agencies, and others, formed Joint Group of Experts on the Scientific Aspects of Marine Pollution (GESAMP) to coordinate a global approach to studying the marine pollution problem. Under GESAMP a pilot project has been organized to monitor oil pollution in the North Atlantic Ocean and contiguous seas. Regional programs might be incorporated into the world program, such as the Baltic project, coordinated under the International Council for Exploration of the Sea.

9.19 (7.42) HEAVY METALS IN THE NORTHERN FUR SEAL, CALLORHINUS URSINUS, AND HARBOR SEAL, PHOCA VITULINA RICHARDI

Anas, Raymond E. (Northwest Fisheries Center, National Marine Fisheries Service, NOAA, 2725 Montlake Blvd. E., Seattle, WA 98112)
Fishery Bulletin 72, No. 1, 133-137 (Jan. 1974)

Heavy metals are persistent contaminants that ultimately end up in the oceans. Little is known of the sublethal effects of these contaminants on living marine resources, but some heavy metals are known to be harmful. One ppb (part per billion) of four commonly used organomercurial fungicides reduced the photosynthetic rate of a marine diatom (Harriss, White, and MacFarlane, 1970). Skerfving, Hansson, and Lindsten (1970) reported chromosome breakage in humans who ate fish containing 1-7 ppm (parts per million) methylmercury.

Heavy metals are added to the sea by land erosion, volcanic activity, and man. A committee of experts selected mercury, lead, cadmium, and arsenic as the four inorganic pollutants most threatening to the marine environment [Food and Agriculture Organization of the United Nations, Fish. Rep. 99, Suppl. 1, 123 pp. (1971)]. The same elements were selected for this study. Average levels of the four most critical heavy metals in the ocean are about 0.00003 ppm (mg/l) mercury, 0.08 ppm cadmium, 0.00003 ppm lead, and 0.003 ppm arsenic. Other workers found 0.00027 ppm mercury at 10-m depth and 0.000029-0.000096 ppm from 100-m to 4,080-m depth in water samples taken 430 kg southeast of San Diego, Calif.

Amounts of contaminants in seals provide us with data at this time in a marine species near the top of the food web in the ocean. This report documents the

9.19 (9.8) BIOLOGICAL CYCLES FOR TOXIC ELEMENTS IN THE ENVIRONMENT

Wood, J. M. (School of Chemical Sciences, University of Illinois, Urbana, IL 61801)
Science 183, No. 4129, 1049-1052 (Mar. 15, 1974)

Some of the chemical and biochemical transformations of toxic elements in the environment, with special emphasis on the role played by microorganisms, are described. The author shows further that our present knowledge of the biological cycles of toxic elements allows prediction of the behavior of other toxic elements in the environment. The biological cycle for mercury is described and summarized in a diagram. Interconversions of mercury compounds create a dynamic system of reversible reactions that result in steady state levels of methylmercury in sediments. However, these steady state levels of methylmercury do not necessarily reflect the rate of synthesis of methylmercury; thus the determination of the concentration of methylmercury in a sediment is a meaningless exercise. To determine a particular instance of mercury pollution, only measurements of the level of total mercury in sediments and the rate of methylmercury uptake in fish would give meaningful results. The kinetics of the process are therefore important.

There is also a biological cycle for arsenic in the environment. Arsenic compounds are reduced and methylated to produce dimethylarsine and trimethylarsine (volatile chemicals and extremely toxic). The two compounds are readily oxidized to the less toxic cacodylic acid. But, cacodylic acid is also an intermediate in the synthesis of dimethylarsine from arsenic salts. Thus, there is also a biological cycle for arsenic as well as mercury. On the basis of knowledge of arsenic

9.19 (7.42)

amounts of mercury, lead, cadmium, and arsenic in northern fur seals and of mercury in harbor seals, Phoca vitulina richardi.

Samples of liver, muscle, and kidney from fur seal, Callorhinus ursinus, and liver from harbor seal, Phoca vitulina richardi, were analyzed for total mercury. Liver and kidney of fur seals were analyzed for lead, cadmium, and arsenic. Fur seals were from the Pribilof Islands, Alaska, and from off the Washington coast. Harbor seals were from the waters of southern California, Oregon, Washington, and the Bering Sea. All of the samples, including a fetus taken 3 mo before birth, contained mercury, lead, and cadmium. Arsenic was not detected. Mercury was highest in liver, followed by kidney, then muscle. The maximum concentration of mercury in liver was about 700 ppm in a southern California harbor seal and 170 ppm in a fur seal taken off the Washington coast. Concentrations of cadmium and lead were highest in the kidney (maximums of 1.8 ppm lead and 15.6 ppm cadmium) of fur seals. Concentrations of mercury did not correlate with age in muscle or kidney ($P > 0.05$) but did correlate significantly with age in liver ($P < 0.01$). Concentrations of cadmium and lead in liver and kidney did not correlate with age ($P > 0.05$). In samples of liver collected from harbor seals, the highest concentrations of mercury were from southern California seals.
[3 tables, 20 references]

[Author's abstract and part of text. Slightly edited in part]

9.19 (9.8)

chemistry, predictions can be made of similar metabolic reactions for selenium, tellurium, and sulfur.

Accordingly, small disturbances in the biological cycles of toxic elements will affect natural balances that will in turn affect the levels of toxic intermediates. Considerable care must be exercised in deciding which species of a toxic element should be monitored in the environment, because failure to consider the biological transformations can make useless the development of models for the flow of chemicals through the environment.
[3 figures, 1 table, 18 references]

FTP

9.19 USE OF HISTOLOGIC AND HISTOCHEMICAL ASSESSMENTS IN THE PROGNOSIS OF THE EFFECTS OF AQUATIC POLLUTANTS (0.4)

Hinton, D. E., M. W. Kendall, and B. B. Silver (Sch. Med., Univ. Louisville, Louisville, Ky.)
Chemical Abstracts 80, No. 10, 52101e (Mar. 11, 1974)

9.19 (0.5)(9.17)

The results showed that the deterministic model gave better results for total coliform, presumably because of a lack of a strong dependency between environmental conditions in the stream and total coliform population. Since such dependency did exist for fecal coliforms, a statistical model incorporating this relationship was the better model for fecal coliform. It was learned, too, that models or constants previously developed do not apply to other streams; thus the choice and evaluation of a model should be accompanied by extensive verification. Currently the deterministic model would be preferred because of the lack of a complete data base for the statistical model. However, the advent of additional amounts of water quality data on river basins may merit reexamination of statistical models for predictive purposes.
[2 figures, 4 tables, 13 references]

FTP

9.19 (9.3)

The solution of worldwide problems of marine pollution can be achieved only through international legislative action combined with strong backing by scientific research and monitoring of the oceans. Many national programs will have to be coordinated by an international mechanism probably under the Inter-Governmental Oceanographic Commission. In the final analysis, the problem of marine pollution in the world can only be solved by cooperation of the nations controlling pollution nationally first and then internationally.

The appendix of the article consists of recommendations of the UN Conference on the Human Environment, Stockholm, Sweden, 5-16 June 1972 (UNGA, MS, 1972), relevant to the global pollution problem. The article contains a list of the international conventions and other agreements for control of marine pollution and another list of international organizations and conferences dealing with marine pollution.
[2 tables, 137 references]

SW

6.34 (6.36) ALGIN SALT/MANNOGALACTAN GUM-CONTAINING AQUEOUS COSMETIC LOTION

Habersberger, Francis (Marine Colloids, Inc.) (pat.)
U.S. Patent 3,764,707 (Oct. 9, 1973)
Chemical Abstracts 80, No. 4, 19399k (Jan. 28, 1974)

6.34 (6.36) AIRPORT RUNWAY COATING TO SHORTEN LANDING DISTANCE OF AIRCRAFT

Fujisawa, Shin, and Asaji Kondo (Fuji Photo Film Co., Ltd.) (pat.)
Japan. 72 43,432 (Nov. 2, 1972)
Chemical Abstracts 80, No. 4, 16622s (Jan. 28, 1974)

6.54 SEAFOOD-FLAVORED COMPOSITIONS

Chhuy, Lim C., and Edgar A. Day (International Flavors and Fragrances Inc.) (pat.)
British Patent 1,333,527 (Oct. 10, 1973)
Chemical Abstracts 80, No. 1, 2435w (Jan. 7, 1974)

6.54 AMINO ACID CONDIMENT

Sudo, Nobuyuki, Nobuo Nakajima, Takeshi Toyoda, and Kohzo Ogawa (Takeda Chemical Industries, Ltd.) (pat.)
Japan. 72 48,666 (Dec. 7, 1972)
Chemical Abstracts 80, No. 1, 2418t (Jan. 7, 1974)

6.36 (6.34) ICE CREAM AND SHERBET WHICH FORM A JELLY AFTER MELTING

Kasahara, Emiko (pat.)
Japan. 73 20,313 (June 20, 1973)
Chemical Abstracts 80, No. 5, 26090f (Feb. 4, 1974)

6.36 ABSORPTION OIL EMULSION

Sakurai, Zenjiro (Shinsei Medicines Industry Co., Ltd.) (pat.)
Japan. 73 11,323 (Apr. 12, 1973)
Chemical Abstracts 80, No. 6, 29126h (Feb. 11, 1974)

9.2 COSTS AND RETURNS IN COMMERCIAL FISHING.
MULLET FISHING - FLORIDA. A CASE STUDY

Anderson, C. L., and R. H. McNutt (Florida Cooperative Extension Service)
Florida Sea Grant Publication SUSF-SG-73-002, Marine Economics Series, Published by the State University System of Florida, Gainesville, Fla. (n.d.), 4 pp.

Development of cost and return data for a fishing enterprise is essential when seeking sources of available credit. This report presents costs and returns for an individual commercial fisherman for 1 year's operation. The data include amounts and kinds of fish caught, range of prices received, and gross revenue. The annual budget shows revenue, expenses, and estimated returns. One table gives the depreciation schedule for launch, skiffs, nets, and boat and net house building. [3 tables] FTP

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ANALYSIS, ORGANIC		
Determination of Benzo(a)pyrene in Smoke Condensates by High Pressure Rapid Liquid-Liquid Chromatography	18	7.59
AQUACULTURE		
Syllabus of Fish Health Management. I. Fish Culture Methods II. Fish Disease Diagnosis	21	9.16
AQUACULTURE -- FEEDING AND NUTRITION		
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